Centre for
Resource Studies

Queen's University
Kingston, Ontario

Financing Canadian Mining in the 1980s: Strategies for Action

Edited by
DAVID YUDELMAN

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FOREWORD

The CRS seminar series assembles individuals from industry, governments, labour, universities, and other organizations to exchange views on selected mineral policy issues. This volume draws on the proceedings of the 11th CRS Policy Discussion Seminar, 'Financing for Survival in the 1980s: Strategies for Short and Long-term Action in the Canadian Mining Industry', held in Kingston on March 15-17, 1983. It also incorporates other commissioned papers. The subject of mine financing enabled CRS to bring together those primarily concerned with the mining industry and those whose primary expertise is in banking and finance. The importance of mine financing and its institutional context has been highlighted by recent events and the seminar provided a forum for a diverse group of experts which would not normally gather together to discuss such problems.

The contributors to this volume were chosen, not only as experts in their own fields, but also to represent a broad spectrum of viewpoints. They were brought together to listen to the prepared papers, to discuss them, and to debate the policy implications of their findings. Subsequently, they were sent summaries of major issues covered, and authors were encouraged to revise and add to their original papers. Additional material was commissioned by CRS to tie together the material in the seminar proceedings, and this volume is the result.

The seminar program was organized by David Yudelman of the Centre for Resource Studies, with assistance from Peter Richardson of the School of Business at Queen's University. Drawing on the proceedings, and expanding it with new material, Dr. Yudelman has edited this volume with the help of Margot Wojciechowski and Donna Beaubien, of the Centre for Resource Studies.

The opinions expressed are those of individual participants, and do not necessarily represent the views of the Centre for Resource Studies or its sponsors.

Brian W. Mackenzie
Interim Executive Director
Centre for Resource Studies

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INTRODUCTION

David Yudelman

It's not politics that is worrying this country: it's the Second Payment

- Will Rogers, *Autobiography*

Financing a Range of Mineral Activities

A great deal of attention has been focused on the problem of raising mine finance in developing countries,[1] but comparatively little literature has been produced on the more advanced countries, such as Canada. Partly because of the trend in the 1970s and early 1980s towards megaprojects, frighteningly high interest rates and large losses from operations, analysts have recently begun to turn their attention to mine financing in developed countries.

Writing on the subject, however, has been rather fragmentary to date. Contributions have emerged from the banks and other financial institutions, from academics, and from the industry;[2] but frequently these considered the problem in relative isolation. A great deal of the new attention to the problem has tended to focus on new projects and project finance.[3] In Canada, despite some preoccupation with high-technology industrial developments, major project investments in areas such as mining, petrochemicals and energy are still, a major study suggests, the key to Canada's economic growth.[4] Seldom, however, is there any full consideration of other sources of finance and their relationship to project finance. Even when various sources of finance have been examined, the focus is often restricted to such aspects as mineral law.[5]

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[1] Stephen A. Zorn, 'Conference Review: The United Nations Panel on International Mining Finance', in Natural Resources Forum, 23, 1978, pp. 291-299. See also M. Radetzki and S. Zorn, Financing Mining Projects in Developing Countries: A United Nations Survey, London, 1979; Marguerite Marion Manshreck, 'Transnational Mineral Agreements in the Third World, with special reference to Indonesia', Institut Universitaire de Hautes Etudes Internationales, Geneva, 1982; Rex Bosson and Bension Varon, The Mining Industry and the Developing Countries, Washington, 1977, pp. 185-186, 210-211; Louis T. Wells Jr. and David N. Smith, Negotiating Third World Mineral Agreements: Promises as Prologue, Cambridge, Mass., 1976.

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[2] Kenneth G. Arne, 'Basic Concepts of Mine Financing', Mining Magazine, March 1982; Kendall Cork, 'Finance in the Mining Industry: A Staff Study Prepared for the Royal Commission on Banking and Finance', Toronto, 1962; H.F. Campbell, 'The Market Price of Risk in the Canadian Mining Industry', (Kingston: Centre for Resource Studies, 1980); William T. Cannon, Financing and Stabilization Policies in a Cyclical Industry: The Case of Inco in the Seventies (Kingston, Centre for Resource Studies, 1981); and 'New Mining Ventures: The Case for Preserving After-Tax Financing', (Kingston, Centre for Resource Studies, 1979).

[3] Christian F. Baiz III, 'The Private Sector Role in Financing Mineral Projects', in Materials and Society, vol. 6, no. 1, 1982; Neil R. Benson, 'Project Financing - banking response to a new environment' in The Canadian Bank and ICB Review, Toronto, 1980; Grover R. Castle, 'Project Financing - Guidelines for the Commercial Banker', Journal of Commercial Bank Lending, April 1975; Chemical Bank, Seminar on Project Finance, New York, May 1978; Arthur L. English and Derek J. Johnston, 'Project Financing in Canada', Toronto-Dominion Bank, Toronto, 1980; Peter Nevitt, Project Financing, London, 1979; R.E. Pike, 'Resource Development and Banking: A Positive Partnership', Canadian Institute of Mining and Metallurgy, Quebec, 1982; R.E. Pike and J.T. Thibodeau, 'The Role of Banks in Mining Projects', Mining Magazine, October 1981; Linda Sandler, 'The surge in nonrecourse financing', Institutional Investor, April 1982; Tomek Ulatowski, 'Importance of Financing in Project Planning', Mining Engineering, June 1980; Donald J. Worth, 'Borrowed capital a more frequent feature in financing plans for new mines', Northern Miner, 28 November 1974; Larry Wynant, 'Project Financing - Tailoring a Funding Package to the Project's Needs', (London, Ontario: University of Western Ontario, 1978); and 'Project Financing for Extractive Ventures: Impact of Reporting Practices on a Firm's Borrowing Capacity', Management Accounting, New York, October 1978.

While project finance is clearly a vital source of mine finance, this study will examine other types of mine finance as well, and the policy issues surrounding them. The basic distinction is, of course, between equity capital and debt capital. Equity capital, in theory, assumes most of the risks and is eligible to make the greatest returns. Loan capital takes fewer risks, and therefore earns a more strictly defined reward. Many events over the last decade or so, outlined in some detail in this study, have tended to blur the distinction between equity and debt financing.

The development of a working mine involves several distinct phases of a cycle, and each phase tends to require a distinct type of funding. Broadly speaking, equity capital finances the early, most risky, phases while loan capital finances later phases when the project is more fully established. One can distinguish at least four phases[6]:

i grass roots exploration;
ii proving up;
iii development;
iv mine operation.

Grass roots exploration

This encompasses the preliminary stages of exploration, where a common guess puts the chance of success in the order of one in a thousand. This is the stage at which geological studies begin, reconnaissance of the field is initiated, land positions are obtained, and core drilling is initiated. The type of financing required here is high-risk venture capital exploration funding, largely through equity and internally generated flows. Important in this regard is the current issue of whether regulation of the securities market should be relaxed further to allow simpler and easier access to the gamble-oriented investor.

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[4] The Canada West Foundation's 10-volume study of the economic impact of 341 major projects under way or planned to 1995.

[5] For example, the symposium held by the Rocky Mountain Mineral Law Foundation on 'Mineral Financing', at Denver, Colorado, November 11-12, 1982.

[6] The discussion following relies on the papers in this study; on the discussions at the 11th CRS Policy Discussion Seminar, 'Financing for Survival in the 1980s', and Kenneth G. Arne, 'Basic Concepts of Mine Financing'.

Another source, not yet widely used in mining but with potential for development, is 'tax shelter funds'. This is money which, if not invested in mineral exploration or some equally risky activity, would normally be paid by corporations or high-income individuals to Revenue Canada. Government policies have an overriding influence on the strength of tax shelter flows, as they determine the legal conditions for such flows. Policy problems arising in this phase, and discussed below, include:

- the issue of whether to relax regulations further to allow nonproducers who have no other sources of income to 'flow through' their tax benefits to investors who can use the write-offs;
- the issue of whether the high risks of the first phase of mining ventures receive sufficient reward incentives in the tax system.

Junior mining, traditionally not tax sheltered, is only just beginning to be provided with the opportunity to draw on this source of funds (see Conclusion).

Proving Up or Firming Up

Once the deposit has been confirmed, the level of risk falls slightly. There is still considerable uncertainty about ore grade, capital costs, operating and processing costs, and commodity prices, and the project could easily be abandoned at this stage. The preliminary economic study has to be made, more drilling is required to delineate the orebody, and a final feasibility study has to be undertaken. If the rights are held by a major company, it might finance this stage internally; if they are held by a junior company, it might try to sell all or part of these rights to a major company, or it might float a public stock offering. Policy issues for governments arising from this phase of development are very similar to those concerning the grass roots phase: the need for adequate incentives to attract equity money to high-risk ventures.

Development

Once a development decision has been taken, much larger sources of capital become necessary than for the earlier stages. With adequate data and feasibility studies behind the project, risks are correspondingly reduced to a more defined, more manageable level. Debt finance becomes a viable option for the first time. Lenders, with more limited risk preferences, can now be attracted. Equity funding at this stage can take the form of ordinary or preference shares, or even convertible debentures, but these are notoriously cyclical as a source (see Gillin's paper). Thus, debt financing continues to have its attractions, as a flexible source of funds with the added feature of tax deductibility to offset high interest rates.

The development stage, for reasons returned to below, has been increasingly funded by loan capital and progressively more exotic forms of equity capital. The latter, through devices such as preferred status and convertibility to ordinary shares, offer the investor some of the security normally offered to a lender, and some of the profit potential normally reserved for equity investors. Loan capital has also taken various forms, including the much-vaunted project lending. Governments have become more involved, usually by guaranteeing loans, sometimes by granting low-interest loans directly.

The apparently increasing reliance of new mining projects on loan capital has created a concern about the front-end loading effect of inflation: it forces, in practice, an unusually early pay-back of the loan principal (Kalymon's paper is devoted entirely to this problem and to its policy implications). Of great concern within the industry is the need for new projects to offer a rapid payback period if loan funding is to be attracted at reasonable terms. Policy options for government (detailed below: see Glenshaw, MacCulloch and Yudelman, and others) to aid rapid payback range from a restoration of the three-year tax holiday for new mines to guaranteeing of the stability of the tax regime during the tax period. These latter suggestions, however, tend to address the problem of a different revenue split between industry and government rather than the central concern of this study: the structural financing changes which make otherwise nonviable projects into feasible projects.

Mine operation

Once the capital phase is funded, the financing of permanent investment in plant and equipment may be converted into term loans. To attract this type of funding, managers need to concern themselves with all the usual issues of profitability, productivity, market development, stability of tax regimes and soundness of balance sheets. The traditional source of working capital has been internal cash flow or short-term bank lending. The Bank Act makes it possible to raise working capital by pledging minerals in warehouse or in transit, or even in stockpile at the mine. Thus the survival of Canadian mining companies depends not only on the ability to finance new projects, but also on the need for basic corporate refinancing and the restoration of working capital levels.

Figure 1 is a schematic representation of the phases of a mining project and the varieties of financing possibilities appropriate to the different phases.

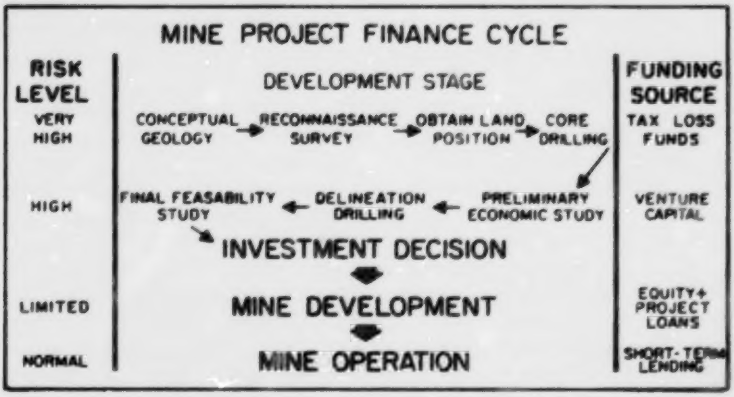
MINE PROJECT FINANCE CYCLE
RISK LEVEL
VERY HIGH
HIGH
LIMITED
NORMAL
DEVELOPMENT STAGE
CONCEPTUAL GEOLOGY
RECONNAISSANCE SURVEY
OBTAIN LAND POSITION
CORE DRILLING
PRELIMINARY ECONOMIC STUDY
DELINEATION DRILLING
FINAL FEASABILITY STUDY
INVESTMENT DECISION
MINE DEVELOPMENT
MINE OPERATION
FUNDING SOURCE
TAX LOSS FUNDS
VENTURE CAPITAL
EQUITY+ PROJECT LOANS
SHORT-TER LENDING

Figure 1. Mine project finance cycle

Source: Kenneth G. Arne, 'Basic Concepts of Mine Financing', Mining Magazine, March 1982, p. 230.

The Shift to Bank Finance

While the cycle of mine finance - the gradual move from equity to debt funding as the risk becomes more manageable - still applies, loan finance came, in the 1970s and early

1980s, to be far more influential than was traditional in the mining industry. There is at present a reversal of this trend, but it is by no means clear how durable this reversal will be, or whether it is a temporary recoiling from what seems to be an abyss.

Before 1967, bank loans 'were largely of an operating or short-term nature, usually with receivables and inventory pledged as security.'[7] In 1967 there was a major revision of the federally administered Bank Act which had two major effects:

i banks were allowed to take direct mortgage security;
ii the 6-percent interest ceiling on loans was removed.

The effect was immediate. Canadian dollar loans to the mining industry, $134 million in 1964, rose to over $250 million in 1970, approached $1 billion by 1975, and moved from $1.8 billion in 1980 to $2.9 billion in 1981.[8] These figures understate the growth of bank finance in the mining industry, as they exclude bankers' acceptances and U.S. dollar loans.

The take-off of bank mining finance, of course, did not occur merely because the banks had been freed from previous restrictions, nor even as a mere outgrowth of the expansionary mood of the late 1960s and the newly available pools of Eurodollars. In addition one must look at the mining industry itself. After the market lows of 1970 and 1971 the industry benefited from a strong upsurge in metal prices. Commodity prices, led by oil, moved strongly and it became conventional wisdom to argue that resources were in long-term short supply.

Mining expanded rapidly and the banks moved aggressively to take an active part in its financing. They reduced their equity requirements on projects from the 50 percent level to about 20 percent, and lower in some cases. Many took on risks and margins which they were to regret in the subsequent commodity crash of 1982, though failures were more common in the international arena than in Canada.

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7. Ronald E. Pike, 'Resource Development and Banking', p. 12.
8. Ibid., p. 8, figure 1. D.J. Worth, 'Borrowed capital a more frequent feature in financing plans for new mines', p. 1.

Canadian mining companies, however, moved into a debt position which could only be described as precarious. By the end of 1982, total borrowed funds for mining companies with assets of over $10 million amounted to $7.8 billion, compared to net worth of $11.2 billion, a ratio of 0.7 (see Bradly and Sultan). Some would argue that the dependence on loan capital is overstated because the figures include long-term liabilities which amount to loans from shareholders at preferential rates (see Dorland's paper).

Recovery has been slow, and the relationship of debt to equity capital in the balance sheets of the major mining companies remained a major issue with important policy implications at the end of 1983. To mention but one, companies have asked the government to permit debt/equity swaps with as little tax liability as possible, to improve their balance sheet ratios (see Conclusion).

A number of successful equity issues in 1983 took some of the pressure off mining industry balance sheets. In the first quarter Canadian mining companies went to the market for over $500 million. Over the same period, U.S. companies in general went to Wall Street for over $20 billion.[9] These moves alleviated the excessive dependence on short-term variable-rate debt which is so inappropriate to the mining industry, with its long lead times and need for stability. It did not, however, remove the problem and, as is pointed out below (see Gillin's paper), such 'windows' of opportunity in the equity market are all too rare. Longer-term government policy measures to assist in restoring the balance between equity and loan capital are therefore as necessary as ever.

Project finance

Bank financing can be broadly divided into two categories: balance sheet financing and project financing. Balance sheet financing consists of borrowing based on the financial strength of the borrower, with guarantees of payment by the parent company or companies. It generally commands a lower interest rate than project financing but directly increases the total debt exposure of the parent company and requires a fixed repayment schedule not necessarily related to cash flows of the project.[10]

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9. Financial Post, 26 March 1983; Wall Street Journal, 8 March 1983.
10. Ian W. Ross, 'Financing the U.K. North Sea', American Institute of Mining, Metallurgical and Petroleum Engineers, Dallas, 1979.

Project finance, by contrast, looks primarily to the project itself, both for security and repayment. Although it has become an immensely fashionable concept in the last decade, there is much debate still on exactly what it is and, indeed, whether it is anything really new or unique. The formation of the Suez Canal Company in 1856 at a cost of £17 million has been put forward to illustrate that the idea is not really novel. The idea was also used extensively in the 1930s to finance independent oil 'wildcatters' in the USA. The banks developed what came to be known as 'production payment finance', which some regard as the first real and widespread example of true project financing. This technique was employed widely by banks in Alberta in the 1950s.

The key to project finance and its uniqueness, if any, is the concept of non-recourse loans. Fully non-recourse loans would have no claim on the resources of the sponsoring company or companies. The lender looks to the project to repay the loan, and has no recourse to the sponsoring company. The liability does not appear on the balance sheet of the parent company. This off-balance sheet financing in turn lessens the impact of the debt on the creditworthiness of the sponsor, and may allow project finance at a far higher debt-equity ratio than would have been possible for the sponsoring company itself. Banks were attracted by the high front-end fees generated by project financing. Some took on risks at spreads which they have subsequently come to regret.

Accounting authorities, however, have closed many loopholes in recent years by insisting on increased recognition of 'off balance sheet' project liabilities in the balance sheets of companies. Critics of the concept of project finance argue, moreover, that there are very few truly non-recourse deals. Though the sponsor may not formally guarantee payment, it will frequently be required to make operating undertakings which amount to the same thing. Even if there is no formal agreement, a sponsor might be impelled to stand ultimately behind its projects merely to protect its reputation.

Nevertheless, project financing does, in certain circumstances, have advantages over straight balance sheet loans. Some of these, and their implications, are explored below (see especially Greenwald's paper).

Management and financing strategy

The balance between debt and equity is, to a major degree, a management decision. At times the 'over-leveraged' state of Canadian mining balance sheets may reflect the reluctance of existing owners and managers to dilute their current share of control. At the extreme, this reluctance results in a highly risk-prone financial strategy.

The problem receded in 1982-83 with the sudden rush to the equity markets (see the Erola, Gillin and Powis papers), but it will be some time before one can be sure that the lessons of the early 1980s have been fully assimilated.

Mining finance: a real problem?

It has been argued, by contributors to this volume among others (see Powis, for example), that finance can always be found for viable projects. The real problems facing the Canadian mining industry are seen to be the need to find better deposits, and exploit them more efficiently. Finally, the industry needs to be able to market its products more energetically in an international environment unclouded as far as possible by subsidies and direct protection by the governments of its competitors and its customers. Against this background, such factors as mineral prices, labour and environmental costs, and productivity are seen to be central to the development of viable new projects.

These factors clearly are vital to the industry, but this type of argument tends to miss the point, for two reasons:

i some of the most important factors, particularly international mineral prices, cannot be influenced (let alone controlled) by Canadian mineral policy;

ii the argument that finance can always be found for viable mineral projects is a tautology, since the viability itself is dependent on the cost of finance among other things. Changes in the cost of capital can have a significant effect on the viability of mining projects (Mackenzie's paper demonstrates this in some detail).

Mine finance and its policy implications

The cost of mine finance is only one of its many dimensions. Those concerned with the policy implications of the issue need also to look at its availability (see paper by MacCulloch and Yudelman). In 1981-82 the high level of interest rates, combined with high inflation rates and the crash in prices, focused attention mainly on the crippling cost of debt being borne by the mining (and other) companies. High interest and inflation rates, however, are at least partially a cyclical problem, as was made clear by their dramatic reduction in late 1982 and early 1983.

The partially cyclical nature of these problems should not, however, be allowed to conceal the fact that there is a serious structural or secular problem as well: a shift away from equity and long-term bond finance to bank finance over the past decade. Bank finance is typically short term, high cost and granted on a floating-rate basis, none of which is conducive to the development of a healthy mining industry. Such a mismatching of the type of finance with the basic asset involved constitutes what would traditionally be regarded as an inappropriate debt structure.

The shift to bank finance has not been, and will not be, automatically corrected by changes in the business cycle, and must therefore be analyzed as a structural problem. Various contributions below make suggestions as to what should be done to make coexistence with bank finance more feasible: how to minimize its cost and volatility. Others have attacked the problem of attracting more equity finance, and on increasingly flexible terms. And suggestions have been made as to how some aspects of the long-term bond market might be partially resuscitated by, for example, making increasing use of funds generated by pension funds and other institutions, though it is clear that no miraculous recovery is anticipated.

Ironically, while the depth of the business cycle depression - the cyclical problem - has shifted the mining industry's attention to short-term financing problems and away from the need to address questions of financing new projects (because very few other than in precious metals are being seriously contemplated), the present phase of the cycle also provides an ideal opportunity to address the structural, long-term issues of financing. Governments, for one thing, are far more likely to be receptive to structural changes at a time of shut-downs, bankruptcy and growing unemployment. It is an equally good time for industry and the financial institutions to rethink their priorities, not only in terms of what they need from government policy measures affecting mine financing, but also in terms of what they can contribute to such policies.

The papers below reflect this multifaceted effort. Broadly speaking, there appear to be two distinct areas of innovation possible:

i new relationships and financial innovations between mining companies, lenders, risk takers and even suppliers, facilitated by government with a minimum of direct intervention;

ii restructuring of the fiscal, legal and regulatory environment for mining finance, as determined through government policy and agencies.

Some in the industry, particularly those concerned with the exploration and proving-up phases, want more government aid and subsidies . But this study is more concerned with recommending measures through which government would minimize and rationalize its regulatory functions to achieve the greatest possible efficiencies, with the least possible intervention.

Though there are instances of special pleading in the papers below - from governments and the financial institutions as well as the mining industry - there is a greater emphasis on formulating clear guidelines for structural change in the financing of Canadian mining in both the above areas of innovation. The process of change has already begun, but its specific configuration and outcome has yet to be determined.

PART I BACKGROUND

A STATISTICAL PERSPECTIVE

Albert Dorland

Introduction

The objective of this volume is to come up with innovative proposals for financing of the Canadian mining industry (excluding oil and natural gas). However, in order to come up with realistic proposals, we first have to know the scope of the problem. How much money are we talking about? What sort of money: debt? equity? What role does taxation play? How does the mining industry stack up against other industrial sectors in Canada? In other words, before looking to the future, we should be fully aware of what has happened in the past and what is happening currently. How and why did the mining industry arrive at its present state of crisis?

The financing of a corporation, and therefore, of a group of corporations as an industry, is reflected in its aggregated balance sheets, income statements and retained earnings. Changes are reflected over time. This paper endeavours to present a perspective of the mining industry over the last decade, as revealed through corporation financial statistics aggregated data.[1]

Priority of attention is given to long-term financing (i.e. funds maturing beyond the current financial year being examined) with the focus of attention being upon metal mining, which constitutes about two-thirds of total mining. (See appendix, table A, for number of corporations in each industry within mining in 1980, with dollar amounts for assets, equity, sales, pretax-profits, taxable income and comparison with non-financial corporations.)

Invested Capital

Basically, the invested capital of a corporation consists of:

i funds invested by the owners (i.e. share capital, plus accumulated undistributed earnings and any contributed or other surpluses).

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1. See appendix note 1 on 'Data Limitations'.

ii long-term funds on loan to the corporation. Of the long-term liabilities, the major components are:

- funds raised by way of public or private sales of bonds, mortgages, debentures, etc.;
- long-term bank loans;
- funds lent by a parent company or affiliate;
- reserves for future income taxes.

Funds obtained from the public and from financial institutions (whether debt or equity) are contingent upon the relative risks of mining vs. other industries, the quality of management, ability to cover interest and to repay debt, anticipated future profits - all the usual constraints of the capital market.

Funds provided by a parent company or affiliate may be at less than market rates of interest and are often not subject to the same constraints of security and ability to pay that regular arm's-length transactions would face. In many cases, 'due to shareholders or affiliates', is virtually 'equity' on a secured basis. Share capital may also be taken up by a parent or affiliate for purposes of obtaining or maintaining control, rather than simply pure market considerations based on the expected rate of return. A fairly common practice in the mining industry is for new and under-capitalized ventures to issue shares in payment for geological and engineering services supplied, in lieu of cash.

Reserves for future income taxes have been rapidly growing in importance over the past decade. Some people consider it an interest-free loan from the government. Accountants are not unanimous in their opinions as to whether to treat reserves for future income taxes as 'liability' and hence a part of debt, or merely a provision and therefore a part of equity. In an industry that is growing, these annual provisions give the appearance of a steadily accumulating fund which is never, in fact, called upon to meet these future liabilities since they are always deferred into more distant future periods - much like Alice's proverbial 'jam tomorrow, but never today'. Everybody agrees, however, that the funds generated in the account are funds available to finance the industry and for which the company bears no interest costs. Reserves for future taxes might, therefore, be more properly considered a part of equity rather than debt.[2]

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[2] In the analysis of the components of capital employed below, we have left reserves for future income taxes as a part of debt (as most companies report it). In

Capital Employed

Table 1 shows the amounts of capital employed in the metal mining industry in 1980, the relative proportions of the components of capital employed, and their changes over the period 1972 to 1980.[3]

Over the period, the equity portion increased from a 58 percent share to 64 percent while the debt portion decreased from 42 percent to 36 percent. Reserves for future income taxes grew at the fastest rate (up 40 percent) and increased its respective share from 6 percent to 11 percent of capital employed. On the other hand, net long-term debt's share dropped from 24 percent of capital employed to 18 percent. Common and preferred stocks' proportionate share rose from 13 percent of capital employed to 19 percent.

Size of Firm

Small companies (assets less than $10 million) had a much greater reliance upon borrowing from shareholders and affiliates than did larger companies, 21 percent vs. 5 percent, and were less able to depend on long term debt, 11 percent vs. 18 percent. Common and preferred shares for smaller companies were vastly more important as a source of funds, 57 percent vs. 19 percent, and since the majority of smaller companies have earned no profit, retained earnings were negative vs. 40 percent for the large companies.

Country of Control

Difference in the components of capital employed, between Canadian-controlled and foreign-controlled corporations are also revealing. Canadian-controlled companies had to rely more on bank loans and other external borrowing, 20 percent vs. 13 percent, and had much less reliance on loans from shareholders and affiliates, 4 percent vs. 8 percent.

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considering return on equity, we have not included 'Reserves for future income taxes' as a part of equity, although we have added back to equity 'long term due to shareholders or affiliates'. In calculating net profit after taxes, we have added back the current year's provision for 'deferred income taxes' into the net profit in making our calculations.

3. Source: Statistics Canada, Corporation Financial Statistics, Catalogue No. 61-207, annual publications.

TABLE 1

CAPITAL EMPLOYED: METAL MINING, 1972 AND 1980

Amounts in 1980 $ millions	Index of growth 1972=100 1980	Chief Components of Debt and Equity and Total Capital Employed	% Share of Capital Employed 1972		% Share Corporations with under $10 million Assets 1980	% Share Corporations $10 million Assets, by control 1980	
			1972	1980		Foreign	Canadian
$ 2,998	167	Net long-term debt	24	18	11	13	20
1,802	409	Reserve for future income taxes	6	11	8	12	13
880	131	Due to shareholders, affiliates	9	5	21	8	4
6,055	194	Total long-term liabilities	42	36	40	33	37
3,228	323	Common and preferred shares	13	19	57	7	15
6,806	243	Retained earnings	37	40	neg.	41	41
10,841	249	Total equity	58	64	60	67	63
16,896	226	Total capital employed	100	100	100	100	100

TABLE 2

METAL MINING: COMPANIES WITH MORE THAN $10 MILLION ASSETS

Year	1980				1981				1982			
Quarters	1	2	3	4	1	2	3	4	1	2	3	4[b]
Cash flow[a]	1,165	930	753	865	583	664	488	254	130	185	-18	55
Capital expenditures	303	437	470	660	472	498	634	417	446	489	456	209
Current taxes	298	255	177	170	124	128	26	-9	31	24	13	0
Cash dividends declared	187	230	204	306	241	206	271	211	181	122	130	58
Cash outlays	788	922	851	1136	837	832	931	619	658	635	599	267
Cash flow / Cash outlays	1.48	1.01	.88	.76	.70	.80	.52	.41	.20	.29	neg	neg

Source: Statistics Canada, Industrial Corporations - Financial Statistics, Catalogue No. 61-003, quarterly publications.

[a] Income before provision for income taxes - depreciation, depletion and amortization.

[b] Preliminary estimates based on partial data.

In the equity section, common and preferred shares constituted double the share of capital employed for Canadian companies, 15 percent vs. 7 percent for foreign-controlled companies.[4]

For comparative purposes, the proportionate share of capital employed in metal mines compared to non-financial for 1980 is given in the appendix (table B).

Source and Application of Funds[5]

During this period, an average of $1.6 billion of funds a year was provided, of which 51 percent was generated internally after payments of dividends averaging $473 million a year, 22 percent through net additions to long-term debt, heavily concentrated in the years 1981 and 1982, and 19 percent through issuing additional ordinary and preferred shares, heavily concentrated in 1981.

During the same 13-year period, net capital expenditures averaged $1.1 billion a year and represented 68 percent of the total application of funds, while 31 percent was expended on net increases in intercorporate long-term investments. Of the capital expenditures, in the period 1978 to 1982, 61 percent was for land, plant and equipment, and 39 percent for capitalized exploration and development charges.

It should be noted that, in the 13-year period, nearly 75 percent of the total increase in long-term intercorporate investment took place in the years 1977 to 1981 and more particularly in the high profit years 1979 to 1980, where large investments were made outside metal mining, chiefly in the forest products industries and in the energy sector.

Nearly 75 percent of the new increase in long-term intercorporate investment in the years 1977 to 1981 was financed by the issuance of additional share capital.

Cash Flow 1980-82 by quarter[6]

Declining sales against rising operating expenses characterized operating performance from 1980 onwards. This is dra-

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4. Source: Statistics Canada, Corporations and Labour Unions Returns Act, Part I, Corporations Annual, Catalogue No. 61-210.
5. Metal mining industry 1970-82.
6. Metal mining companies with more than $10 million in assets.

matically portrayed by the quarter-to-quarter steady drop in cash flow from $1,165 million in the first quarter of 1980 to a negative $18 million by the third quarter of 1982. The decline in cash flow is demonstrated in table 2 where the figures indicate the interest coverage ratio declined from 1.5 times to negative.

Interest Expenses (see appendix, table C)

Interest expenses as a percent of total expenses have tended to be higher in metal mining than in total non-financial, averaging 5 percent in the period 1972-80 vs. 2.4 percent. Nevertheless, the interest coverage for the same period in metal mining (as measured by net profit after taxes and interest expenses, to total interest expenses) was significantly higher than in total non-financial, averaging 4.5 times against 2.9 times. One would have expected that, because of this superior debt coverage ratio, the metal mining industry would have found it comparatively easier to raise long-term loan funds than was the case for other industries. Interest expenses to total expenses in metal mining almost doubled to 10 percent by the 3rd quarter of 1982 and coverage dropped to negative. The big problem of the industry in 1981 and 1982 was the squeeze on profit margins brought about by sharply lower sales against only slightly declining overall costs (with the interest component of costs going against the slight decline in labour and costs of materials). In times of sharply rising sales, an increase in the cost of borrowed funds might have been bearable. However, in times of shrinking sales, even a slight increase was 'one more nail in the coffin' in the bleak profit performance of the industry.

Performance/Profitability (see appendix, table D)

As an efficient user of capital, measured by pre-tax return on capital employed, the metal mining industry has had no clear advantage over other industries. Though more volatile on a year-to-year basis than manufacturing or total non-financial, its average (weighted) return over the period 1972-80 was only 13.3 percent, compared to 14.4 percent for total manufacturing and 11.3 percent for total non-financial.

The pre-tax return on equity (including long-term due to shareholders) shows the same pattern, higher and lower in some years, but on weighted average over the years

1972-1980 only 19.2 percent, compared to 19.2 percent for total manufacturing and 17.4 percent for total non-financial.

On an after-tax basis, the return on equity averaged 14.1 percent, only marginally higher than the 13.8 percent return for total manufacturing and 13.0 percent for total non-financial. Over the long term one might question whether the returns have compensated investors for the relatively higher risks involved, even with preferential tax treatment (as will be elaborated upon later in this paper).

Country of control seems to have had an influence on profitability.[7] In 1980, corporations with assets of $10-25 million in metal mining had a pre-tax return on equity of 63.0 percent for the foreign-controlled companies and 30 percent for the Canadian-controlled companies. In the larger companies, assets $25 million and over, foreign-controlled companies showed a return of 24.1 percent, compared to 27.4 percent for the Canadian-controlled companies.

Pre-tax return on capital employed reflected somewhat the same pattern as the return on equity. In the $10-25 million asset size group, foreign-controlled companies earned 43.3 percent vs. 24.8 percent for the Canadian, while in the $25 million and over asset size group, the respective rates of return were 18.1 percent and 18.3 percent.

Performance measures reflect the dominance of the largest corporations, which are markedly superior to the medium and small companies. A majority of the small companies are dormant or not yet in production, so profits are very low or indeed negative.

Relative Taxation of the Metal Mining and Manufacturing Industries

Incentive programs, built into the Canadian tax system, have generally favoured the metal mining industry. Over the past decade the more significant incentives fall into two categories:

i incentives to encourage new fixed capital formation;
ii incentives to invest in depressed economic regions in Canada.

The mining industry is well placed to benefit from both categories because it is a capital-intensive industry and

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7. Source: Statistics Canada, Corporations and Labour Unions Returns Act, Part I, Corporations Annual 1980.

because mines are situated in rural regions that, to a considerable degree, tend to be less developed economically.

The more important provisions of the Income Tax Act affecting the mining industry are: resource allowances, accelerated capital cost allowances, exploration and development expenses, depletion allowances, and the investment tax credit. A brief description of each is provided in the appendix, note 2.

One measure of the overall impact of these incentives is the ratios of income taxes paid to industry book profits for metal mining and other industries; in particular, manufacturing. The profit figures are taken net of losses and are adjusted to exclude Canadian dividends, which would otherwise introduce an element of double counting and capital gains which are not profits originating out of current production.

In determining the definition of taxes, the treatment of provincial mining taxes is less clear. Strictly speaking, they do not originate with income tax legislation, but, nevertheless, are classified in the National Accounts as a direct tax since they may be based on profits. Provincial royalties on the other hand are treated as an indirect tax. Neither category is, at present, allowed as a deduction for income tax purposes. In appendix table F, the effective industry tax ratios are calculated for years 1972 to 1980. The ratios are shown both ways, with and without mining taxes. The weighted averages for the entire period are an excellent indicator of relative tax burden because the distorting short-term effects of book losses and prior year tax losses are averaged out. (A loss, netted against profits in a current year, may be carried forward to reduce taxes in a future period.) As may be seen, the effective tax rates are consistently lower in metal mining than in either manufacturing or total non-financial industries, except for the years 1974 and 1975. Over the entire period, the average rate for metal mining was 26.9 percent (or 17.8 percent if provincial mining taxes were excluded). This compares with 32.2 percent for manufacturing and 32.3 percent for total non-financial industries (see appendix table F).

A brief review of certain tax legislation in the 1970s will help explain why the effective tax rates were higher in the years 1974 to 1975. Essentially, the principal cause of the lower rates in the earlier period was the exempt mine income provision of the Income Tax Act. When it was repealed at the end of 1973, the exemption from taxable income was $449 million and constituted a tax benefit of almost half that amount. To the metal mining industry this tax preference had served to reduce considerably the effective tax rate: for instance, from 40.5 percent[8] to 21.6 percent in 1973.

In the subsequent year, developments in the energy sector were to affect the mining industry as well. In response to OPEC price increases, several provinces moved to increase their royalty taxes and this was countered by federal legislation disallowing the deduction of royalties and provincial mining taxes in calculating taxable income.

Although the industry received compensation in the form of a 15 percent resource profits abatement, this was barely sufficient. At the same time, the nominal federal tax rate was 50 percent in mining while the rate was declining in manufacturing. It remained for the resource allowance, introduced in 1976, to return the effective tax rate to its former lower levels. For instance, in 1976 the resource allowance had served to reduce the average rate from 49.1 percent[9] to 31 percent.

In summation, the overall preferential tax advantage to the metal mining industry of 5.3 percentage points compared to manufacturing may be translated into dollar benefits: for example, $138 million in 1979 and $150 million in 1980, the last two years for which full data are available.[10] No attempt has been made to partition the benefit between permanent and timing differences: that is, to divide the reduction in income taxes paid between a permanent reduction (which lowers the total provision for income taxes) and the deferred portion (which may at the aggregate level be postponed indefinitely).

The importance of the timing differences generally may be seen in the increasing role deferred income taxes have come to play as a source of funds in metal mining. As of 1972, they constituted 6 percent of capital employed, and as of 1980 they accounted for 11 percent[11] compared to manufacturing, where the figures were 5 percent and 9 percent respectively.

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[8] This was calculated by applying the ratio of income taxes to taxable income for the industry against the deduction for exempt mine income. The assumption is made that all other deductions and credits would have remained the same.

[9] See footnote 8.

[10] Calculated by multiplying the percentage point difference (5.3) times adjusted book profits for metal mining of $2,606 million in 1979 and $2,827 in 1980.

[11] Source: Statistics Canada, Corporation Taxation Statistics, Catalogue No. 61-208, derived from data contained in appendix, table 2.

The significance of the tax overall 'tax advantage' vis-à-vis manufacturing may be seen in its impact on cash flow. Referring to the source and application of funds statement in the appendix, the dollar benefits estimated for 1979 and 1980 in the metal mining industry accounted for 5 percent of cash flow in each year.

Financing - Future Outlook

The metal mining industry is characterized by a high degree of volatility in terms of sales, production and prices as evidenced by the statistics over the past ten years. Investors view this volatility with some fear that investments in this industry are more risky. Higher risk investments require an expectation of higher returns and greater financial strength. However, the average rate of return to shareholders over the past 11 years has not been markedly different (within 1 percent) of all other industries combined. The metal mines should have a lower debt-to-equity ratio than other industries to attract new capital and, in fact, almost all new capital investment in the industry has been financed by earnings retained in the industry as opposed to debt financing over the past 11 years.

In 1981 and 1982 the industry as a whole, with the exception of gold, experienced the worst decline in recent history in prices, sales, production and profits. The growth in sales of 2.59 times from 1972 to 1980 was almost identical to 2.57 times for all non-financial industries. But 1982 sales were only 1.06 times 1972 levels compared to 2.86 times 1972 levels for all non-financial industries. This serious decline has resulted in inventory build-ups, declines in working capital, and a much lower utilization of plant and equipment. In the near term, one must conclude that current conditions will definitely reduce levels of new capital investment. The present outlook for 1983 new investment in plant and equipment is 16 percent lower than 1982 levels, which is a significant reversal from an average annual growth rate of 33 percent.

Looking at the period from 1972 to 1982, new capital investment grew from an annual level of $620 million in the early 1970s to a peak of $2 billion in 1981. The preliminary estimate for 1982 is $1.6 billion. Net funds retained, which are defined as profits before deferred income tax, depreciation, depletion and amortization, and after deducting dividends paid out, experienced a roller-coaster type growth from a low of $399 million in 1972 to a high of $2.1 billion in 1979. The decline from the 1979 high was very dramatic and sudden, ending in a negative $207 million for 1982.

The annual average over the 11-year period to 1982 for net funds retained and new capital investment is $0.9 billion and $1.1 billion respectively. Assuming similar investment and profit relationships in the future, one could conclude that debt financing will not play a major role in financing new investment over the long haul.

Looking at the short term, however, from year to year, the investment-to-profit relationships vary. In years where profits are markedly lower than investment, the industry will require external sources of financing over and above the $200 million on average per year. The industry is now in a very weak financial position and will require a major rebuilding job to restore its balance sheet to 1979/80 levels. In 1982, net internally-generated funds retained were a negative $207 million compared to new investments of $1.6 billion. Even with the forecasted 16 percent decline in investment for 1983, there will be a requirement for external financing of over $1 billion unless profits recover significantly. In addition, there will be a prior claim on future internally-generated funds to rebuild working capital which declined from a high of $3.2 billion in 1980 to current levels of $1.3 billion.

Appendix

Note 1: Data limitations

Data are derived from the financial statements submitted by corporations as a part of their tax returns filed with the Department of National Revenue Taxation. Each corporation or Canadian branch is required to file on an unconsolidated basis and each corporation is classified to an industry based on its major source of income. The Standard Industrial Classification used is the 1960 SIC. Data for large corporations (assets greater than $10 million) are transcribed on a universe basis, and for smaller companies, estimates are based on a sample. It should be appreciated that some companies classified to metal mining may include data with respect to non-metal mining activities, in cases where there is only one legal entity filing a T2. However, if the non-metal mining activities are carried out by separately incorporated companies (rather than by unincorporated divisions), then these activities will fall in their appropriate industry and not metal mining.

Similarly, some metal mines in the development stage may be classified to mining services, since their only activity is exploration and drilling. They may or may not report income; expenses may be capitalized. Some mining companies may also be classified to other industries such as SIC 756 'Investment holding companies', since their revenue is derived, not from sales of products, but from dividends, royalties, and capital gains from the sale of developed properties.

Note 2: Definition of Main Tax Items Affecting Metal Mines

Resource Allowance: the deduction in calculating taxable income as provided under the Income Tax Act, Section 20, effective January 1, 1976. It is equal to 25 percent of resource profits, defined as profits after operating expenses and capital cost allowance but before exploration and development expenses, interest expense, and depletion allowance.

Capital Cost Allowance: allowable deductions from income, at rates not exceeding those prescribed by Schedule B of the Income Tax Regulations, of the capital cost of depreciable property. The allowances are shown net of any recaptured capital cost allowances in the case of dispositions.

(Information on accelerated allowances for certain classes of assets is shown below.)

Class 28 assets: mining assets acquired after November 7, 1969, in respect of a new mine or major expansion of an existing mine. The normal rate is 30 percent of undepreciated capital cost. However, the accelerated allowance is the full amount of the income from the mine. This incentive replaces the three-year tax exempt income of new mines which expired at the end of 1973.

Class 29 assets: new machinery and equipment acquired after May 8, 1972, for manufacturing and processing. The allowable deduction is up to 50 percent of the capital cost until the class is fully written off.

Exempt mine income: under the former Income Tax Act, the income from the operation of a new mine was not included in computing taxable income for a period of three years from the start of production of reasonable commercial quantities. The new act has no such provision. Transitional provision, however, was made to enable new mines to claim this exemption until the end of 1973.

Canadian exploration expenses: the deduction allowed under Section 66 of the act of up to 100 percent of a corporation's cumulative Canadian exploration expenses. Such expenses, which for book purposes may be either expensed or capitalized, include costs incurred in prospecting, exploring and searching for minerals, oil and gas in Canada. Also included under this item are Canadian exploration and development expenses incurred prior to 1974 which may be claimed at the 100 percent rate, and, beginning November 16, 1978, expenses to develop mineral resources.

Depletion allowance: the deduction allowed under Section 65 of the act and Part XII of the regulations. The allowance consists principally of 'earned depletion' which may be deducted at the rate of $1 for every $3 of eligible capital, exploration or development expenditures to the extent of 25 percent of resource profits. Commencing in 1977 this item includes 'frontier exploration allowances, which may be deducted at the rate of $2 for every $3 in excess of $5 million spent per oil or gas well drilled. Commencing in 1978 this item also includes 'supplementary depletion' which may be deducted to the extent of 50 percent of income at the rate of $1 for every $2 expenditure on enhanced oil recovery systems and $1 for every $3 expenditure for bituminous sands equipment.

Mining taxes allowed: corporations were allowed a deduction in calculating taxable income in respect of income taxes imposed on mining operations by certain provinces. For taxation years ending after May 6, 1974, the deduction is only permitted to a small group of industrial mineral mines such as sand and clay pits and stone quarries, and is included in item 36 'Other deductions and additions'.

Investment tax credit: the deduction from tax otherwise payable, allowed under Section 127 of the act, which is based on new investment expenditures. The rates for 1979 vary from 7 percent to 20 percent of the cost of new buildings, machinery and equipment for use of logging, mining and manufacturing depending on the region. Current and capital expenditures on scientific research also qualify at the above rates except for small businesses, which are entitled to a 25-percent rate. Commencing November 16, 1978, new transportation equipment qualified at the rate of 7 percent. This credit cannot exceed $15,000 plus one-half tax otherwise payable in excess of $15,000.

APPENDIX TABLE A

CANADIAN MINING INDUSTRY CORPORATE FINANCIAL DATA, 1980
($ millions)

1960 SIC No. and Industry	Assets	Equity	Sales	Pretax Profit	Taxable Income	Number of Companies
051 Placer gold	34.2	8.0	21.9	3.8	2.3	19
052 Gold quartz	1,198.7	856.3	552.6	313.8	137.4	23
053 Copper, gold, silver	4,516.6	2,902.8	2,323.7	854.5	204.2	24
054 Nickel, copper	4,755.6	2,716.3	2,485.6	773.5	429.9	5
055 Silver cobalt	130.2	64.9	68.6	41.2	11.5	6
056 Silver, lead, zinc	3,603.1	1,580.2	2,341.5	652.3	259.9	22
057 Uranium mines	1,776.7	519.0	629.7	238.5	88.3	9
058 Iron mines	2,861.8	1,489.5	1,587.6	191.8	8.4	13
059 Other metal mining	1,060.2	703.7	508.2	201.0	79.1	15
Total metal mines	19,937.1	10,840.7	10,519.3	3,270.3	1,221.0	136
061 Coal mines	1,572.7	766.7	1,067.2	542.5	151.1	27
071 Asbestos mines	1,139.8	704.9	781.8	111.4	58.9	10
073 Gypsum	90.6	86.8	32.3	8.1	4.9	6
077 Salt	85.4	51.7	119.7	18.5	10.2	7
079 Other metal mines	1,245.8	590.1	775.5	205.4	163.5	86
Total non-metal mining	2,561.6	1,433.4	1,709.2	343.4	388.6	109
083 Stone quarries	159.0	67.5	150.2	14.7	10.8	131
087 Sandpits, quarries	331.9	98.0	296.8	20.5	14.6	479
Total quarries	490.9	165.5	447.0	35.2	25.4	610
094 Non-petrol. prospecting	2,447.8	1,093.2	85.7	56.1	7.8	1,294
098 Non-petrol. contract dril.	314.8	79.1	310.7	35.8	25.8	86
099 Other mining services	1,145.2	466.8	1,295.9	259.7	207.7	1,021
Total mining services	3,907.8	1,639.1	1,692.3	351.6	241.3	2,401
295 smelting and refining	2,940.9	1,489.0	2,966.3	765.6	543.4	20
Total mining	31,411.0	16,334.2	18,401.4	5,308.6	2,419.7	3,303
Total Non Financial	463,164.7	167,890.7	546,796.9	42,148.4	25,838.1	340,473

TABLE A.1

Ratios Derived from Table A
(percent)

	Assets	Equity	Sales	Pre-tax Profit	Taxable Income	Number of Companies
Metal mines/total mines	64	66	57	62	50	4
Total mining / Total non-financial	6.8	9.7	3.4	12.6	9.4	1.0
Metal mines / Total non-financial	4.3	6.5	1.9	7.8	4.7	.04

Source: Statistics Canada, *Corporation Financial Statistics*, Catalogue No. 61-208.

APPENDIX TABLE B

CAPITAL EMPLOYED IN NON-FINANCIAL CORPORATIONS, 1980

	Capital Employed ($ million)		Share of Capital Employed (percent)	
	Non-Financial	Metal Mining	Non-Financial	Metal Mining
Net long-term debt	99,438	2,998	131	18
Reserve for future income tax	21,143	1,802	7	11
Due to shareholders, affiliates	30,415	880	9	5
Total Non-Current Liabilities	157,297	6,055	48	36
Common & preferred shares	54,820	3,228	17	19
Retained earnings	101,879	6,806	31	40
Total Equity	167,891	10,841	52	64
Total Capital Employed	325,188	16,890	100	100

APPENDIX TABLE C

INTEREST EXPENSE RATIOS, 1972-80

	Interest Expenses as Percent of Total Expenses		Interest Cover (net profit after-tax less interest divided by interest expenses)	
	Metal Mining	Total Non-Financial	Metal Mining	Total Non-Financial
1972	4.6	1.9	2.8	3.2
1973	5.0	2.1	6.5	3.5
1974	4.7	2.2	5.4	3.4
1975	4.8	2.3	3.5	2.8
1976	5.6	2.5	2.9	2.6
1977	5.2	2.6	3.4	2.5
1978	5.5	2.7	3.9	2.8
1979	4.7	2.8	6.9	3.0
1980	5.3	3.2	5.6	2.7
Average	5.0	2.4	4.5	2.9

APPENDIX TABLE D

RETURN ON INVESTED CAPITAL
(Pre-tax profit as percent of capital employed)

	Metal Mining	Manufacturing	Total Non-Financial
1972	4.5	11.2	17.7
1973	15.6	15.8	10.6
1974	16.9	17.8	12.2
1975	8.7	13.8	13.4
1976	7.3	12.1	11.7
1977	4.9	12.0	10.8
1978	9.9	13.6	10.2
1979	19.0	16.6	12.4
1980	18.3	15.5	12.0
Weighted Av.	13.3	14.4	11.3

APPENDIX TABLE E

RETURN ON EQUITY[a]

	Metal	Mining	Manufacturing		Total Non-Financial	
	Pre-tax	After-tax	Pre-tax	After-tax	Pre-tax	After-tax
1972	6.7	4.8	14.1	9.3	12.1	8.9
1973	22.8	16.9	19.7	14.0	16.6	12.4
1974	24.4	15.0	22.8	16.3	18.9	14.0
1975	12.6	8.6	17.8	12.5	16.0	7.9
1976	10.8	8.5	15.8	11.1	14.9	11.3
1977	7.0	9.5	14.7	13.8	14.2	14.2
1978	14.4	12.0	17.4	13.5	16.4	13.2
1979	27.1	22.2	21.8	16.4	20.1	16.5
1980	26.4	19.9	20.3	14.9	19.6	15.8
Weighted average	19.2	14.1	19.2	13.8	17.4	13.0

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[a] Calculated according to the following formuale, and shown as percent.

Pre-tax return on equity =

$$\frac{\text{net profit before tax}}{\text{equity-long-term due to shareholders}}$$

After-tax return on equity =

$$\frac{\text{net profit after tax + provision for deferred taxes}}{\text{equity-long-term due to shareholders}}$$

APPENDIX TABLE F

EFFECTIVE TAX RATES[a]: METAL MINING, MANUFACTURING AND TOTAL NON-FINANCIAL, 1972-80

(percent of taxable income)

Year	Metal Mining		Manufacturing	Total Non-Financial
	Without Prov. Mining Taxes	With Prov. Mining Taxes		
1972	16.5	26.9	39.4	38.0
1973	12.0	21.6	33.4	33.0
1974	21.5	35.6	33.0	35.3
1975	23.1	40.0	36.2	38.7
1976	17.2	31.0	36.0	37.1
1977	13.1	23.5	32.0	34.3
1978	15.5	23.5	29.2	30.7
1979	15.8	21.3	27.8	27.8
1980	20.6	27.6	31.6	30.3
Weighted Average 1972-1980	17.8	26.9	32.2	32.3

Source: Statistics Canada, Corporation Taxation Statistics, Cat. No. 61-208 annual, derived from table 2 various years, and from statement 14 various years.

[a] Calculated as: federal and provincial income taxes and provincial mining taxes, divided by industry net book profits before taxes adjusted to exclude Canadian dividends and capital gains.

DEVELOPMENTS IN INTERNATIONAL MINING FINANCE

Kathleen J. Murphy

It appears that some of the most important sources of capital are drying up: petrodollars will no longer be so freely available, and much of the Third World is unable to repay its debts to leading private commercial banks. At the same time, there have been some important shifts in power balance, and forms of collaboration between host entities and multinational mining companies over the last decade. A review of their successes and failures suggests that there is a hope - but also an urgent need - for breakthroughs in transnational collaboration in the near future.

This paper examines the developments which have taken place in the large-scale mining of copper, iron ore, bauxite, and nickel (i.e. macroprojects of over $100 million in investment) in the Third World and Australia. For each large-scale project a history of partnerships, contracts, cost escalations, completion delays, etc. was compiled, based on a scan of numerous published sources and supplementary interviews. The resulting data base is referred to in this paper as the 'Survey of Mining Macroprojects 1970-1982'. The major journals, newspapers and periodicals monitored for the mining industry include Engineering and Mining Journal, American Metal Mining, Engineering News Record, Metal Bulletin, U.S. Bureau of Mines, World Mining, New York Times, Financial Times, and Asian Wall Street Journal.

Analysis of these records for the period from 1970 to 1982 reveal several surprising trends:

i the Third World mining industry suffered from underinvestment over that period;
ii at the same time, there were fundamental changes in the parameters of projects undertaken or planned;
iii entry barriers led to unbundling;
iv it fell to financial institutions to fill the gap.

Significant changes will be required over the course of the next decade if the Third World is to maintain a measure of competitiveness in the international mining industry. Some similarities in strategy and policy between Third World and Canadian governments exist which make the findings from this survey useful in evaluating current and future policy options within the Canadian mining sector.

A Long Period of Under-Investment

There have been major shifts away from the Third World to safer environments. During the last decade over 80 percent of new investment in mining took place in the USA, Canada, South Africa and Australia. The USA, as an example, invested only 8 percent of its total foreign investment from 1969 to 1974 in Latin America, as compared with 60 percent in 1950.[1]

Political and fiscal policies within the developing countries were responsible for the shift in investment out of the Third World. Policies of extensive nationalizations and takeovers, the oil embargo, and a high degree of variability in policy - even before a project reached completion - contributed to the exodus of investment. (By comparison, British Columbia experienced a 40 percent drop in exploration after its royalty tax was initiated.[2])

A review of the nationalizations and takeovers that occurred in the late 1960s and early 1970s (figure 1) demonstrates that the key supply countries in Africa and Latin America were seizing the assets of multinationals at an unprecedented rate. Compensation for those assets was very difficult to obtain.

The investment climate was further aggravated by the worldwide recession in the early 1970s and extremely high inflation. The overall management response was to finish projects that were near completion, postpone projects that were under way, and shy away from implementing projects that were in the planning stage. While many projects had been planned, few projects were actually brought to fruition over the last decade (figure 2). Most of the copper (55 percent) and iron ore (65 percent) mining projects proposed remained in the planning or talk stages at the end of the decade. Bauxite and nickel projects were pushed ahead. While nickel projects have the largest percentage completed, a quarter of the total are currently postponed or suspended. Most of the bauxite projects are in the construction stage. Overall, the brief period of very high prices for raw materials in the mid-1970s obscured this slowdown in private investment in the developing sector.

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1. Paul E. Sigmund, Multinationals in Latin America: The Politics of Nationalization, (Madison: the University of Wisconsin, 1980) p. 231.
2. 'Canadian Mining Industry and Constitutional Change', CIM Bulletin, March 1981, p. 28.

Figure 1

HISTORY OF NATIONALIZATIONS: METAL MINING AND PROCESSING

Before 1962:		few
1960	Cuba	nickel plant
1966	Rhodesia	unilateral independence
1966	Zaire	copper, cobalt
1967	Chile	some assets of Cerro Corporation, Anaconda, Kennecott Copper
1969	Zambia	copper, cobalt
1969	Chile	Anaconda (2 mines)
1971	Chile	Bethlehem Steel and Armco Steel subsidiaries; remaining interests of Cerro Corporation, Anaconda, Kennecott Copper
1971	Guyana	Demerara Bauxite Company (Demba)
1971	Guinea	bauxite
	Mauritania	
1972	Bolivia	Tin, lead, zinc
	Ghana	manganese
1973	Peru	Cerro de Pasco Mining
1974	Venezuela	Bethlehem Steel and U.S. Steel subsidiaries
1975	Peru	Marcona Iron Mines
	Uganda	Copper

Other takeovers and nationalizations completed by 1974:

Gabon	Miferma Iron Mine
Ghana	Lonrho, CAST
Guyana	Alcan, Reynolds
Jamaica	Kaiser, et al.
Mauritania	Somifex
Senegal	Taiba
Sierre Leone	Bethlehem Steel, U.S. Steel
Venezuela	Union Miniere
Zambia	Anglo-AMAX

Sources: Norman Girvan, Corporate Imperialism: Conflict and Expropriation, New York, 1978; M. Radetzki and S. Zorn, 'Foreign Finance for LDC Mining Projects', in F. Sideri and F. Johns (eds.), Mining for development in the Third World (New York, 1980); Paul E. Sigmund, Multinationals in Latin America: The Politics of Nationalization, (Madison, Wisconsin, 1980).

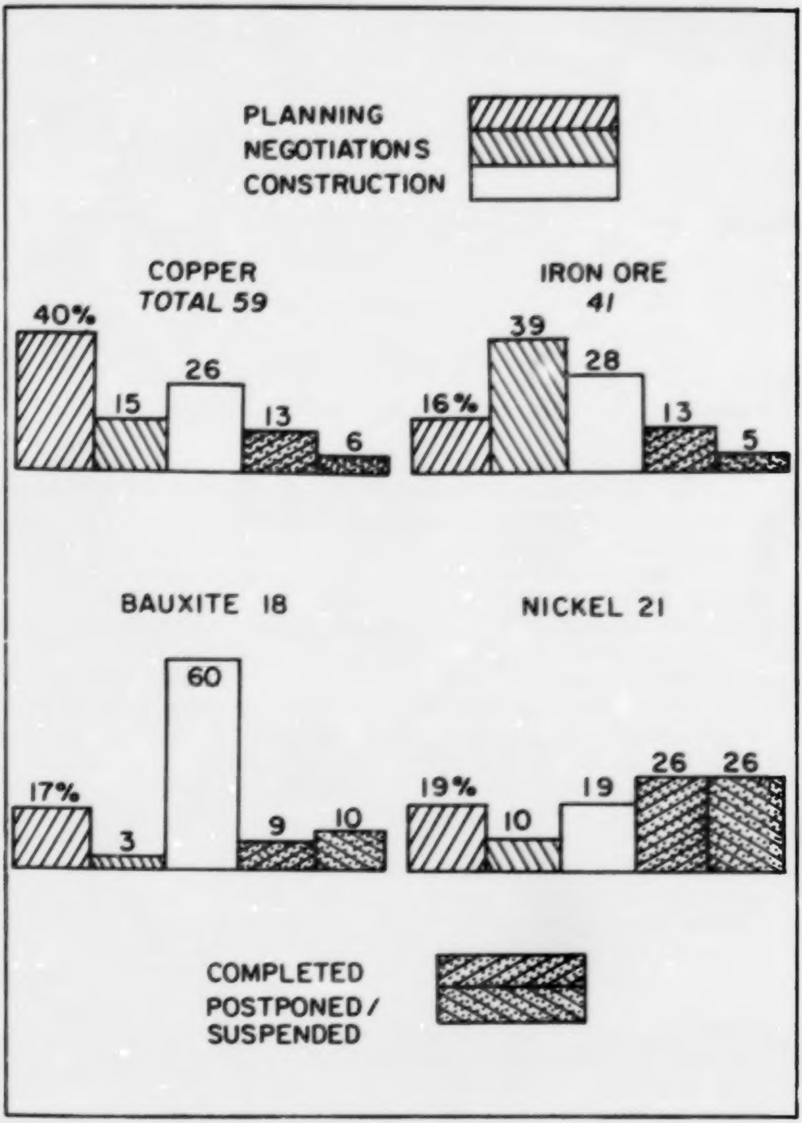

Figure 2. Mining Macroprojects: 1970-1982 by Current Stage of Development

Development efforts, though sharply reduced, were also concentrated in specific areas. Latin America continued to be the main region for mining development activity by foreign investors - particularly in the copper and bauxite sectors (figure 3). Brazil sponsored projects in all industry sectors under discussion (copper, 5 projects, $3,326 million; iron ore 9, $6,828 million; bauxite 3, $1,050 million; and nickel 3, $480 million). Australia sponsored the largest number of iron ore mining projects (11 projects, $4,833 million in total). Other leading mining sponsors include Chile (9 copper projects, $6,719 million); India (5 iron ore projects, $2,345 million); and New Caledonia (5 nickel projects, $1,830 million).

Fundamental Changes in Project Parameters

In addition to the unstable external environment for mining projects in the Third World, there were also fundamental changes in the internal parameters of potential ventures. While it was customary in the industry for a multinational mining company to assume full risk and provide complete financing through equity investment, projects launched during the 1970s were larger in scope, and therefore beyond the capabilities of single companies to assume independently. In fact, the largest percentage of total capital investment had been committed to projects of over $500 million in investment. This was true regardless of project industry sector studied (see figure 4).

The more costly projects are generally more complex in scope. An increase in total project cost is usually due to larger planned production capacity, as well as the increasing tendency of Third World sponsors to integrate forward by adding refineries, smelters, and concentrators to their mining facilities. Six of the top ten mining projects include plans to integrate forward (see table 1). In addition, the newer projects have enormous infrastructure requirements, as the sites that remain to be developed are the more remote and inaccessible. The largest, the Carajas iron mine, will install an enormous infrastructure that includes an export port and an 890 kilometer railroad.

The larger projects are not unfamiliar with budget and schedule problems and violations. Although four out of these top ten projects are still in the early planning or feasibility stages, three projects have experienced cost overruns, and two of these three are currently delayed or postponed.

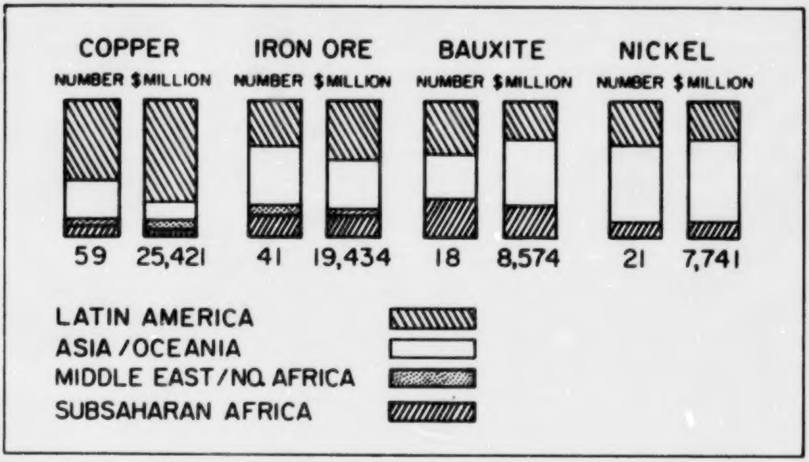

Figure 3. Mining Macroprojects by Geographic Region, 1970-83

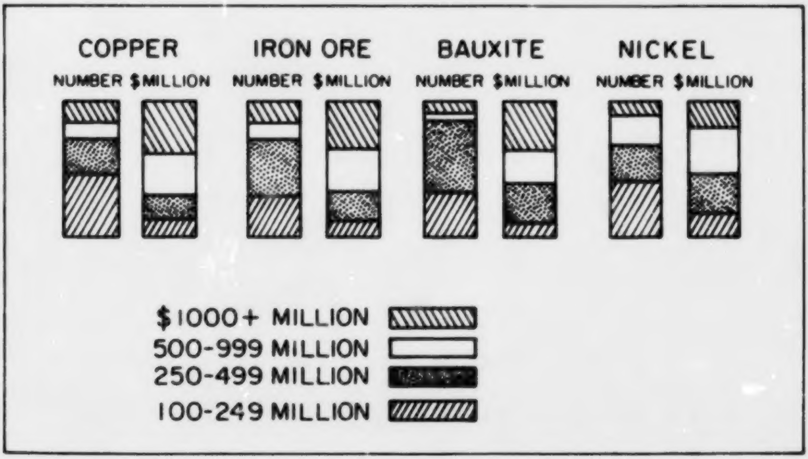

Figure 4. Mining Macroprojects by Project Investment Size, 1970-82

Table 1

TOP TEN MINING MACROPROJECTS 1970-82

Name and Facilities	Location	Capacity	Cost $ billion	Status	Completion Date	Lead Sponsors
Carajas iron mine, export port, railroad (891 km)	Brazil	20M tpy	4.9	Financing	1985	Cia. Vale do Rio Doce
Orissa State bauxite mine and Alumina refinery	India	2.4M tpy	2.1	Underway	1986	India Government
El Teniente copper mine expansion	Chile	38k tpy	1.5	Feasibility	2001	Codelco
La Caridad copper mine and concentrator	Mexico	150k tpy	1.2	Completed	1979	Mexicana de Cobre (Jt. Ven.) Asarco (33%); Mexico Govt. (44%); Mexican cos. (33%)
El Pachon copper mine and smelter	Argentina	100k tpy	1.2	Plan	1986	Cia. Minera Aguilar
Los Bronces copper mine	Chile		1.2	Feasibility	1986	Cia. Minera Disputada de las Condes (Jt. Ven.): Exxon 87%); Enami (Chile, 11%)
S.E. Perth bauxite mine	Australia	1M tpy	1.1	Construction	1982	Worsley Alumina (Jt. Ven.): Reynolds (40%); Shell (30); Dampier (20); Kobe Alum. Assoc (10)
Marandeo iron mine[a]	Australia	18M tpy	1.0	Agreed	1990	Texasgulf (50%); Hancock & Wright (50)
Wologesi iron mine/pellet plant[b]	Liberia	10M tpy	1.0	Delayed (76, 77, 79)		Kawasaki (26%); AMAX (25); C. Itoh (12); Nissho Iwai (12); Marubeni (13)
Gag Island nickel mine and refinery[c]	Indonesia	51M tpy	1.0	Postponed (75, 79)		Indonesia Govt. (20%); Amoco (20); Hoogovens (30); U.S. Steel (30)

Source: Survey of Mining Macroprojects: 1970-1982.
[a] Cost escalation: Marendeo $625-1000 million; [b] Wologesi $600-1000 million; [c] Gag Island $700-1000 million.

Some project histories have more than their share of difficulties. For example, the Wologesi iron mine and pellet plant, a joint venture between a consortium of Japanese companies (75 percent equity) and AMAX, U.S. (25 percent), experienced numerous cost escalations. The cost was $600 million in 1974; $800 million in 1977; and $1000 million, in 1979. Revised in 1974, the project was delayed again in 1976, revived in 1977, abandoned later in 1977, and revived and delayed again by 1979.

Longer lifecycles can play a big part in driving up the costs of very large-scale projects. Based on a sample of completed projects only, the average number of years taken to complete a mining macroproject in the 1970s ranged from three to ten years, with seven years being the average. It was extremely difficult to survive the decade without an escalation in development costs, it seems, as seven out of these ten projects had overruns, ranging from 25 to 233 percent. Two-thirds of the projects also experienced completion delays, ranging from one to four years (see table 2).

Table 2

LIFECYCLE OF LARGE-SCALE MINING PROJECTS: EXAMPLES OF COMPLETED PROJECTS

Project Name	Location	Investment ($ million)	Overrun (percent)	Lifecycle Dates	Years	Years Delay
Cerro Verde copper mine (stage 1)	Peru	100-200	100	t1971-77	6	
Cobriza copper mine concentrator expansion	Peru	160-181	13	1974-82	8	2
Cuajone copper mine	Peru	350-730	109	1970-77	7	1
La Caridad copper mine	Mexico	671		1971-79	9	
Mt. Klahoyo iron mine/pellet plant	Ivory Coast	400-500	25	1970-80	10	
Paraburdoo iron mine	Australia	312		1971-74	3	
Robe River iron mine	Australia	300-400	33	1972-78	6	3
Sar Chesman copper mine	Iran	300-893	197	1970-79	9	4
Trombetus River bauxite mine and refinery	Brazil	120-400	233	1973-80	7	3
Average			101		7	2.5

Source: Survey of Mining Macroprojects, 1970-1982.

The extent of cost overruns is surprising. When cost escalations are compared for the total sample, copper mining projects overran on average by 152 percent (and this is in spite of the fact that many of these projects are still in the planning stages). Iron ore mining projects overran by more than 100 percent, although 51 to 100 percent was the average. Bauxite and nickel projects (which, as noted earlier, had more projects underway or completed) had a less severe track record: bauxite projects overran by about 69 percent in the cases studied, while the nickel projects overran by about 52 percent on average (although these have experienced the most frequent instances of postponements or suspensions) (see figure 5).

Cost overruns seem to have been both enormous and frequent. It appears projects within certain size-categories have been most prone to difficulties. All of the iron ore and nickel projects over $1000 million, and two-thirds of the copper mining projects and all of the bauxite mining projects of between $500 and $999 million in investment experienced cost overruns, and half of the bauxite and nickel projects of between $250 and 499 million in investment had similar fates (figure 6).

Other patterns can be found. Some countries seem to have difficulties in certain project sectors. Five of Australia's eleven iron mine projects overran, as well as eight of Peru's twelve copper projects, two of Brazil's three bauxite projects, and both of Venezuela's bauxite projects. Three out of four of Liberia's iron mine projects were delayed; and two out of four of New Caledonia's nickel projects were suspended or abandoned.

With the real potential that a project will double in cost, even before it is under way, project participants have become increasingly cautious about making further commitments to mining development in the Third World. When even the strongest and most seasoned host countries are experiencing so much difficulty, even when in collaboration with major MNCs, one must seriously question the effectiveness and competence of the newer approaches to organizing and structuring large-scale development projects.

Entry Barriers Have Led to Unbundling

Host countries and multinationals have come to realize their limits: hosts have become aware that they cannot undertake a large-scale mining project without the technology, management assistance, and access to capital and marketing networks which the multinationals provide; multinationals,

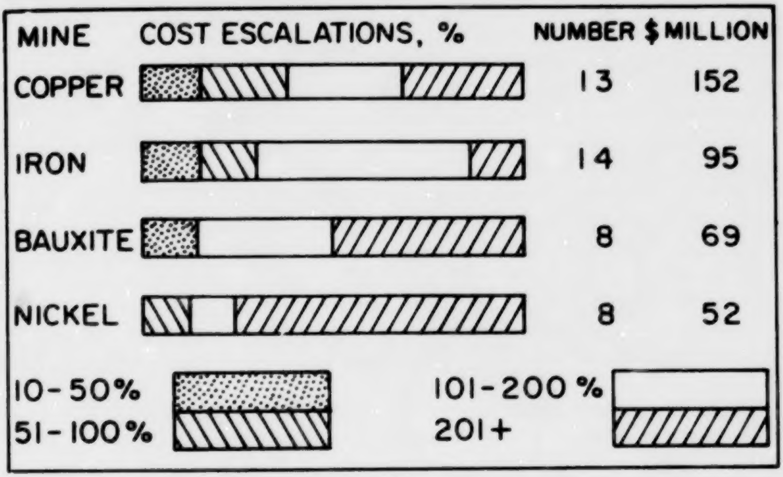

Figure 5. Mining Project Overruns, by Mineral and Percent Cost Escalation

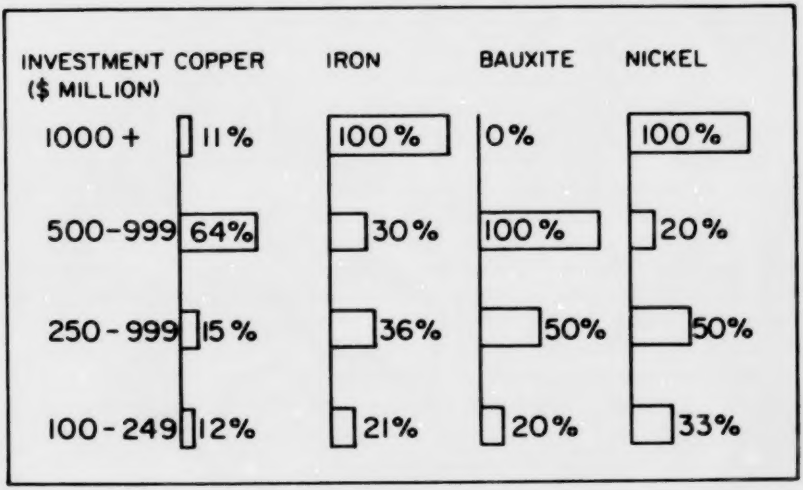

Figure 6. Percent of Total Projects with Cost Escalations by Project Investment Size

on the other hand, have come to realize that they cannot acquire raw materials without the cooperation, support and agreement of the host, or without some remittance of the profits to the host. This has led to an unbundling of risks and responsibilities and a dilution in equity structure, risk, and control. The existence of facilities wholly owned by multinationals is a thing of the past.

Joint ventures by host and MNC, or sole host ownership with contractual arrangements with MNCs are now the rule. Overall, 56 percent of all mining macroprojects are joint ventures; several of these are joint ventures of host organizations only. Since many projects are still in the planning stage, it is likely that the number of joint ventures will increase as negotiations are finalized (figure 7).

The equity commitments of individual partners appear to be highly syndicated, as host organizations and multinationals seldom individually take on majority equity. Minor equity positions are more common; most partners assume between eleven and 25 percent equity, regardless of project type. Eight copper projects, and two iron ore, bauxite, and nickel projects did have majority total MNC equity; two iron and nickel projects even had 100 percent MNC equity. However, no single multinational had majority equity within those partnership groups (figure 8).

Although the industry was highly concentrated one or two decades ago, there are now large numbers of players who are entering into a wide variety of contractual obligations to develop large-scale mining facilities. Within the copper mining sector, for example, two host participants, Mineroperu (7 projects, $2,586 million) and Codelco of Chile (4 projects, $3,109 million) stand out as the most active of all participants. Three of Mineroperu's projects and one of Codelco's are joint ventures. The participants in copper mining projects, as a group, demonstrate the expansion in number of players involved in the development of large-scale mining projects. Host entities outnumber all others. The second largest group of companies are from the USA, followed by the Japanese, Canadians, and Europeans (see table 3).

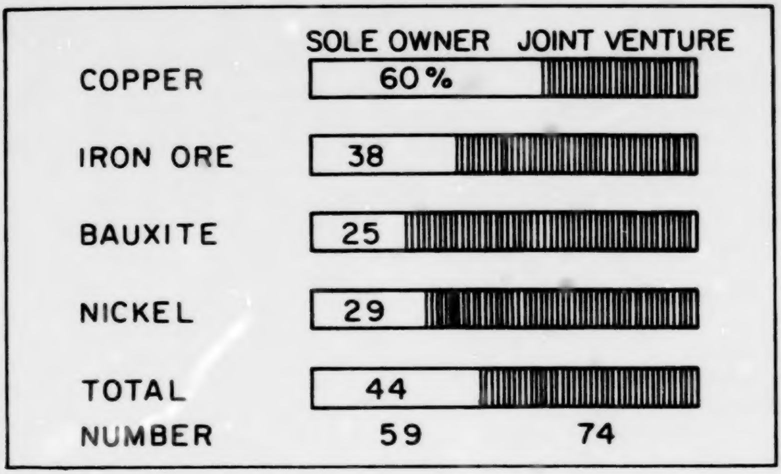

Figure 7. Equity Structure by Type of Project

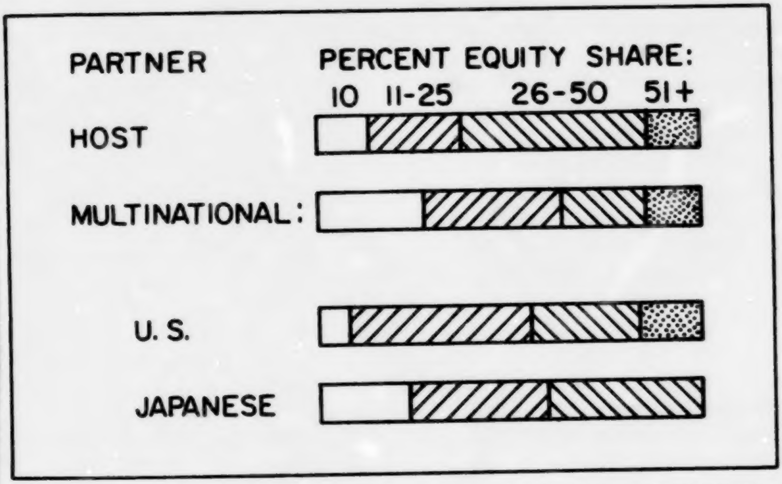

Figure 8. Percent Equity Share by Participant Nationality

Table 3

KEY PLAYERS IN COPPER MINING MACROPROJECTS BY PARTICIPANT NATIONALITY

Participant Nationality	Players	
	Number	Percent
Host	62	57
All multinational	47	43
U.S.	22	20
Japanese	18	17
Canadian	4	3
European	2	2
Other	1	1
Totals	109	100

With the soaring costs of mining development and the enormous risks incurred when one is involved on an equity basis, it appears that the multinational mining companies have arrived at a strategy of syndicating their investments over the widest possible range of economically viable alternatives. Sales of technology, marketing, and services do not carry with them the risks of devaluation, expropriation, erratic changes in government policy regulations, or periodic renegotiations that accompany large-scale equity involvement. Thus, the most active multinationals are not the mining companies, but rather, the engineering/construction companies such as Ralph M. Parsons (4 projects, $3,255 million); Fluor (3 projects, $1,580 million) and McKee (3 projects, $2,681 million), all U.S.-based firms. Parsons has been involved as technical assistant, contractor, and construction manager; Fluor, in feasibility studies and project management; and McKee in assessing project feasibility and as a member of a consortium. Basically, these companies are making technology available contractually by providing managerial as well as extraction technology. No single multinational mining company, by contrast, had more than one or two projects underway in the Third World during that period.

Financial Institutions Filling the Gap

From 1900 to the mid-1960s the multinationals held free reign over mineral resources in Africa and Latin America. They operated as if these were extensions of the developed world, and only an adequate supply of adequate equity was necessary to merit complete control. Enormous changes have occurred in the last ten to fifteen years. As host countries have taken on more financial responsibility along with their many nationalizations and takeovers, and as multinationals have become unwilling or unable to take on large equity commitments independently, project financing approaches and terms have evolved and changed.

Project financing was first experimented with in the mid-1960s. The increasing size of projects created the need to repay debt from the cash flow of a project. At first project financiers lent money on a longer-term basis: that is, from 12 to 15 years. By the early 1970s a 'lead banker' began to assume a role in organizing and managing the financing arrangements. The required equity-to-debt ratio was about 3:1. Completion guarantees were made by the sponsors. The linkage between cash generated from long-term sales contracts for output and loan repayment emerged at this time. Later in the decade, requirements for equity to debt were revised to 2:1; however, completion guarantees became more stringent. The terms of the loans were also reduced, to 5 to 7 years, creating greater cash burdens on the project.[3]

Throughout the 1970s, more complex and varied sources of financing were being mixed and matched to support the increasingly greater need of these larger projects for capital. Mining companies, commercial banks, export finance banks, buyers who provided credits, and international lending agencies who provided government financing, all participated in developing loan packages for host and multinational project participants, and in the projects themselves. The $450 million Bougainville copper project in Papua New Guinea is an example of such multiple-source financing: the government participated in equity, suppliers provided credits tied to purchases of their goods and services, and syndicated banks provided loans (appendix 1). The overall package was a broad mix of interest rates (from 6.8 to 10.6 percent), repayment dates (from 1973 to 1982), and guarantors of completion (sponsors, suppliers, and host governments).

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[3] Paul E. Sigmund, Multinationals in Latin America: the Politics of Nationalization, p. 275.

Lenders look to the project, or to its participants, for guarantees that the project will be completed; an incomplete project has no economic value. Financiers have found that they must assume many of the responsibilities that previously fell to the equity sponsors of a project. Overall, the more syndicated the risks and responsibilities on a macroproject, the more diluted the management control, the more complex the purchase decision process, and the more uncertain the accessibility of international marketing channels for the output. Further, the earlier freedom from government intrusion in the development and operation of a mine is no longer a reality. Financiers have had to overcome these numerous constraints by carefully evaluating to whom they will lend, and under what terms and conditions they will grant the loan.

Gaps in Management Control

Commercial banks, no longer able to depend on the management control that normally goes hand in hand with multinational equity investment, have required more stringent completion guarantees, higher interest rates to cover their higher risks, and stricter and shorter payback periods. Multinationals have continued to enjoy considerable leverage in obtaining loans from commercial banks because of these requirements. Some commercial bank loans are made to the project directly, when the multinational profile on the project is adequate. For example, on the Cuajone copper mine in Peru, the Chase Manhattan Bank made a loan of $400 million to the project; however, U.S. companies held 76 percent of the equity, the lead project manager was a U.S. company, and a U.S. company was going to be manager of the operating company (appendix 2.1). The multinationals' level of control over the day-to-day management of the project satisfied the commercial bank's requirements.

In other cases, most or all of the commercial bank loans are made only to multinationals directly. The Australian banks on the Greenvale nickel-cobalt mine in Australia lent two thirds of their capital directly to the corporations who were equity participants in the project (i.e. Metals Exploration, and Freeport Queensland), and only one third to the project directly (appendix 2.2). In contrast, on the Sangaredi Bauxite mine in the Guinea Republic, Bank of America and Kuhn Loeb chose to lend to the consortium of multinationals rather than to the project directly (appendix 2.3). Other lenders to this project chose different loan recipients: the U.S. Eximbank made their loan directly to Halco, the joint venture company, and the international lending agencies, the World Bank and U.S. Aid, made their loans to the local Guinean contractors.

Gaps in Procurement

Goods and services exporters could previously depend on their long-term direct ties with the multinationals, who were both the equity owners and procurers, to sell their products. With the shift in equity ownership to host organizations, they must now rely on their national export banks to assist in promoting their products. Export credit agencies are willing to provide long-term capital to major mining development projects at low and fixed interest rates on a tied basis. This means that the recipient must purchase goods and services from the lender country, which must in turn provide insurance guarantees for the home-country exporters. In addition, the exporters derive a competitive advantage from the low interest rates. The Tintaya copper mine in Peru, as an example, is completely owned by the host entities, Mineroperu, Centromin, and Cofide. The financing was directly related to the way in which the procurement decisions were made: the feasibility, design, and project management contracts were awarded to two Canadian companies; the Canadian export agency backed these home-based companies by lending $100 million to the project, specifically for payment of these engineering services and associated costs; a Canadian bank syndicate lent another $115 million to the project, thereby eliminating the need to finance the project from equity (appendix 3.1). A similar type of tie between contractor (Bechtel), and Eximbank (USA), as well as a private commercial bank (Manufacturers Hanover) can be seen on the Nonoc Island mine and refinery project in the Philippines (appendix 3.2).

Gaps in Marketing of Output

A considerable amount of risk is added to Third World mining projects in the absence of guarantees by multinationals that the output will be sold through their networks on the world market. Thus, contracts to buy the output of the planned facility can be used as collateral in financing a project. Buyer countries in need of a raw material are willing to provide credit in lieu of long-term purchase agreements for portions of the output. On the Trombetus River bauxite mine in Brazil, the long-term purchasers of 63 percent of the output also took on minority shares of equity (appendix 4.1). Similarly, the $4.9 billion Carajas iron mine in Brazil has attracted $1 billion, or 20 percent of the total financing, from their end-users, the Japanese and Europeans (appendix 4.2). (Further financing is still being arranged.)

Governmental Substitutes

Third World governments and international lending agencies are increasingly providing the managerial stability, so important in attracting financing to the project, that was previously supplied by the multinational equity partners.

In some cases, these governmental agencies are becoming involved in exploration. Since there has been very little investment in exploration by multinational mining companies, the United Nations Development Program has initiated a Revolving Fund to be used in financing mineral exploration. It has conducted 120 mineral exploration projects totalling $100 million to date. This fund requires repayment. The Musogati Region nickel mine in Burundi was discovered with UNDP assistance. Now that the project is in the feasibility stage, sophisticated technology is being provided by U.S. multinationals on a contractual basis, with Parsons studying the engineering feasibility, and UOP conducting the extraction feasibility study (appendix 5.1).

Governmental agencies are also becoming involved in project evaluation. The World Bank and other international lending agencies lend at low and fixed interest rates for long periods of time and usually also evaluate the economic viability of a project, thus building in assurances for other lenders. They usually provide only partial financing, but the technical assistance they offer enhances the reliability of the project for other investors. Further, it is not uncommon to find numerous international lending agencies lending to a single project in poorer developing countries. The Gecamines copper mine expansion in Zaire, and the Selebi-Pikwe copper/nickel mine in Botswana are examples of this (appendix 5.2 and 5.3). In addition to World Bank participation, the Gecamines project received European Investment Bank, as well as Libyan Arab Foreign Bank, loans. The Selebi-Pikwe project was eligible for very long-term Canadian and U.S. aid loans (50 and 30 years) for the infrastructure portion, (in addition to a World Bank loan), as well as an Industrial Development Corporation of South Africa loan for the production facility. Buyers credits and other loans and equity provided the remaining capital needed.

Governmental bodies and agencies have also participated in equity, replicating the role previously played by the multinational. On the Batong Buhay copper mine in the Philippines, the government took 100 percent equity in the Batong Buhay Gold Mines, Inc. through the Development Bank of the Philippines (appendix 5.4). They are channelling $200 million to the project in the form of equity capital. A similar example can be found on the Sierra Grande iron mine in Argentina (appendix 5.5). The joint venture company, Hierro Patagonico de Sierra Grande, S.A. is a joint venture of the provincial government, the National Development Bank, and minor Swedish interests.

Several Future Scenarios Possible

The host countries in the Third World took control of their development process over the last decade and, in the course of events, forced multinational mining companies to take a low profile and shift their investments to safer areas. While the hosts have achieved their short-term objectives, they have failed to achieve any long-term measure of success. They are suffering from a debt crisis at the moment. Regardless of whether or not they will be bailed out, this will have the net effect of further discouraging investment in the area. In addition, host countries themselves have come to realize that nationalization is not all that it was made out to be. The lack of management expertise and access to international market networks and capital sources have proved to be difficult problems for host organizations. In fact, some of the lead nationalizers in the early 1970s were forced to actively attract foreign investment by the latter part of the decade. Chile even withdrew from the Andean Pact, because the terms of the pact were perceived to be discouraging to foreign investment.

In addition, great inefficiencies in project development arose from the lack of experienced management on these large-scale mining projects. Some have even raised the issue of whether the cost of debt versus equity really justifies the inefficiencies being tolerated at this time. For example, Raymond Vernon estimated that loan capital at the rate of 15 to 20 percent with a 3 to 4 percent service contract fee added on is equal to the cost of equity at 15 percent profit, 1 percent royalties, and a possible 4 percent overpricing on purchases.[4] Projects that had a high equity commitment by multinationals appeared to be better managed. One analyst noted that one must seriously consider whether loans with 6 to 8 percent interest used with 50 percent efficiency actually offer any advantage when compared with equity at 10 to 15 percent at 80 percent efficiency.[5] Of course, one could argue that the Third World may be in a transitory or learning period following the restructuring of equity in their mining sectors. Only time will tell whether they can put together an exploration and financial program to take charge fully.

There are several likely future scenarios.

1. **Host countries might succeed in becoming more independent in managing their metal sector.** The lack of exploration for minerals by multinationals and the severe reduction in new investment by multinationals may force host organizations to take more initiatives. The UNDP Revolving Fund is providing a financing vehicle for exploration. International lending agencies might play a stronger role in providing guarantees for these development efforts. The current willingness of international commercial banks, the World Bank, and governments to work together as cofinanciers in resolving current debt rescheduling suggests that these organizations might indeed be effective in working out more creative approaches to financing projects conducted independently by Third World institutions.

The option remains available to Third World project sponsors to acquire access to technology through contracts with international engineering/construction companies and capital goods exporters. Additionally, host organizations can hire experts from developed countries to work within their organizations. Training of local experts in mining engineering, whether at home or abroad, can be inaugurated to compensate for the current shortage of local talent.

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[4] Paul E. Sigmund, Multinationals in Latin America: the Politics of Nationalization, p. 264.

[5] Ibid., pp. 266, 267.

Should the industrialized world actually be on the verge of massive reindustrialization, one could expect a significantly higher demand for metals over the next decade. Such a period of high demand would provide host organizations with the opportunity to build international marketing networks for their output which would, in turn, provide the critical link in their ability to compete over the longer term.

2. Multinationals might succeed in changing the name of the mining game, thus extricating themselves permanently from the need to invest in developing country mining projects. Discouraged by the erratic environment in which they have had to function during the last decade, mining companies may consider depoliticizing the industry by collaborating in the exploitation of mineral resources in space, whether on the moon or on asteriods and meteorites. With some adaptations to the space shuttle program, major breakthroughs in mining approaches could be realized within the next twenty years. If the industry remains in crisis, this time frame could be significantly shortened. The safest approach for individual companies in realizing this program would be to participate in a consortium along the lines of major Japanese consortia: that is, that all mining companies, mineral processors, government financing bodies, etc. take a minority share in the equity and financing of the technology development. All would contribute equally to the financing of research, and receive equal benefits from whatever raw materials are accessed, sharing the profits as well as the losses. Thus, whatever the results are of such experiments in outer space, the competitive environment on earth would not be imbalanced by any favourable or unfavourable outcome.

3. Host entities and multinational mining companies might begin a new era of genuine collaboration. Mining needs to be renewed as an investment opportunity with high risks and high rewards. While it is fair that host countries should reap benefits from their raw materials, it is also fair to say that multinationals should not be expected to give their technology, management expertise, and capital away without a chance at some growth in their investment and attractive returns. Perhaps a longer-term perspective is needed. An income averaging approach might permit mining companies to make a profit, while enabling host governments to be more sensitive to the typically erratic financial performance of mining companies.

Attracting capital to mining projects and to mining companies may not be a function of the availability of sources of capital, but rather, of whether the potential rewards merit taking on the downside risk. The current stalemate is causing an erosion in management skills, in technical know-how, and in production capability. With the possibility of massive worldwide reindustrialization on the horizon, there is a real danger that the management, technology, and skilled work force of the mining sector may not be in shape to meet future challenges. Resolving the financial realities of international large-scale project development would go a long way to improving the overall track record of these 'macro' and highly risky projects.

Appendix 1

Financing of the Bougainville Copper Project (Total Investment $450 million)

1. Equity Investment: $140 million

Shareholders:	Capital ($ million)	Number of Shares	Percent
- Papua New Guinea Govt. (Loan from Australian Government)	28	25,000,000	20.0
- Bougainville Mining	112	100,000,000	80.0
Of which Bougainville Mining:			
- C.R.A. & N.B.H.C.		150,648,552	84.1
- Public		18,917,073	10.6
- Banks		6,684,375	3.8
- Panguna Development Foundation Limited		2,000,000	1.1

2. Equipment Loans: $150 million

Sources:	Maximum Amount ($ million)	Interest Rate (percent)	Repayment Period	Purpose
- Mitsibushi Shoji Kaisha	30.0	8.2	1973-79	General
- Mitsui & Company	30.0	6.8	1973-82	Jap. equip.
- Commonwealth Savings Bank Housing/dev of Australia	13.2	8.0	1974-79	
- Bechtel Pacific Corp. Western Knapp Engineering U.S. Export-Import Bank	46.8	.5 of 6-mo. Euro$ rate	1973-78	U.S. equip. & services
- Reserve Bank of Australia	27.5	To be determined	Deferred	Australian equip. & service
	$ 147.5			

3. Bank Loans: $190 million

A syndicate of North American and European institutions led by Bank of America arranged the following credit agreements.

Sources	Maximum Amount ($ million)	Interest Rate	Repayment Period	Purpose
- Credit agreement	67.4	10.6%	1977	General
- Credit agreement	122.0	6-month Euro$ inter bank rate plus 1.5%	1973-76	General

Source: Michael Dubin and Louis T. Wells. Bougainville Copper. (Intercollegiate Case Clearing House) 1972.

Appendix 2

Commercial Bank Lending - Examples

1. Cuajone Copper Mine, Peru
$350 million (1970) - $730 million (1977)

Equity:

	Join Venture Company (percent share)
Southern Peru Copper Co.	100
- Asarco (U.S.)	52
- Billiton (Netherlands)	12
- Newmont Mining (U.S.)	12
- Cerro Corporation (Peru)	12
- Phelps Dodge (U.S.)	12

Contractor: Fluor (U.S.)	Project Manager
Operations: Asarco (U.S.)	Manager of the operating company

Financing:	Amount ($ million)
Chase Manhattan Bank - lead, international bank consortium loan (50 banks)	253
Equipment finance	140
International Finance Corporation	15
Loans from buyers of copper	54
Debt	462
Equity	264
Total	726

Sources: Survey of Mining Macroprojects (see text of paper for description).
Also, R.F. Mikesell, 'The Role of Foreign Private Investment in Future LDC Mining Projects' in Mining for Development in the Third World, New York, 1980.

Appendix 2 con't

2. Greenvale Nickel-Cobalt Mine, Australia:
$265 million (73) - $390 million (75)

Loans from Australian Banks	Borrowers	Equity
$ 95.0 MM	Metals Exploration Australia	50
95.0	Freeport Queensland	50
100.0	Greenvale (The Project)	

Source: M. Radetzki and S. Zorn, 'Foreign Finance for LDC Mining Projects', in *Mining Development in the Third World*, (New York: Pergamon Press) 1980.

3. Sangaradi Bauxite Mine, Guinea Republic

Loans	Lender	Borrower
$75MM	Bank of America	Halco
75	Kuhn Loeb	Halco
25	U.S. Exim	CBG
65	World Bank	OFAB
21	U.S. Aid	OFAB

Equity		Percent Share
Corp. Bauxite Guinea (CBG)		100
- Halco Mining Consortium		51
- Alcoa (U.A.)	27	
- Alcan (Canada)	27	
- Harvey Alum (U.S.)	20	
- Pechiney (France)	10	
- Ver. Alum Werke (W.Germany)	10	
- Montecatini Edison (Italy)	6	
- Guinea Government		49

Contractor:
- OFAB (Guinea) Consultant/Technical Asst.

Source: Survey of Mining Macroprojects.

Appendix 3

The Role of Export Financing: Examples

1. Tintaya Copper Mine, Peru: $229 million

Financing:	$ million	Rate
Canadian banks syndicate (incl. Toronto Dominion & Bank of Nova Scotia)	115	
Export Development Corp. of Canada	100	9.75

Suppliers:
Simmons International (Canada), preliminary feasibility and design;
Surveyer, Nenninger & Chenevert (Canada), project management contractor.

Equity:

Ematinsa (Peru) (Jt. Ven. Co.) 100%
- Mineroperu
- Centromin (Peru)
- Cofide (Peru Finance Agency)

Source: Survey of Mining Macroprojects.

2. Nonoc Island Mine and Refinery, Philippines: $245 million (71) - $311 million (75)

Financing:

U.S. Eximbank
Manufacturers Hanover Bank

Supplier of Services:
Bechtel US, Contractor

Equity:
Marinduque, Phil. 100%

Source: Survey of Mining Macroprojects.

Appendix 4

Buyers Credits and Long-Term Purchase: Examples

1. Trombetus Rive Bauxite Mine, Brazil: $120-400 million

Long-Term Purchase (percent)	Participants	Percent Equity
	Mineracao Rio do Norte (Joint Venture Company)	
37	Cia Vale do Rio Doce (CVRD)	41
7	Cia Brasileira de Alumino	10
7	Reynolds (US)	5
14	Norsk Hyrdo (Norway)	5
	Ardal og Sunndal (Norway)	5
22	Alcan (Canada)	19
	Billiton Alum. (Netherlands)	5
7	Empr. Nac. de Alum. (Spain)	5
	Superint. de Deserv. (Brazil)	5
7	Min. Rio Xinger (Brazil)	

Source: Survey of Mining Macroprojects.

2. Carajas Iron Mine, Brazil: $4.9 billion

Long-term purchasers: Japan. and Eur. steelmakers
Equity: Cia Vale do Rio Coce (CVRD) 100 percent

Financing	$ million
Japan EXIM Bank	$250
Japanese bonds	150 (in yen)
Private Japanese banks	100 (to CVRD)
European Economic Community	400
Kredit. fur Wieder. (West Germany)	100
World Bank	300
International Finance Corporation	50
National Development Bank of Brazil	740
Morgan Guaranty Trust	interested
Bank of America	interested
Chase Manhattan Bank	interested

Source: Survey of Mining Macroprojects.

Appendix 5

Government Role in Project Financing: Examples

1. Musogati Region Nickel Mine, Burundi: $800 million (79)

   Exploration: UNDP: Revolving Fund

   Equity: Government of Burundi (100%)

   Technology: Parsons (engineering feasibility)
   UOP (extraction feasibility)

   Source: Survey of Mining Macroprojects.

2. Gecamines Copper Mine Expansions, Zaire: $460.4 million

Financing	Years	Grace	Interest Rate	Amount ($ million)
Loans:				
World Bank	15	4	8%	100.0
Libyan Arab Foreign Bk.	15	4	10	100.0
European Investment Bk.	15	4	10.5	20.0
Total loans				220.0
Equity:				
Gecamines - cash penetration				240.4
Total Financing				460.4

Source: M. Radetzki and S. Zorn, 'Foreign Finance for LDC Mining Projects', in Mining Development in the Third World, p. 113.

3. Selebi-Pikwe Copper/Nickel Mine, Botswana: $203.6 million (72)

Financing of Infrastructure	Years	Amount ($ million)
World Bank	20	32.0
U.S. AID	30	6.5
Canadian IDA	50	29.0
Other loans		4.5
Total		71.0

Financing of Production	Percent Share	Amount ($ million)
Equity and sponsors' advances		46.6
BCL Ltd. joint venture co.:		
- Botswana RST	85	
- AMAX (US)	30	
- Anglo-American (Can)	30	
- Botswana Government	15	
Indust. Devel. Corp. of South Africa	10	18.0
Kredit. fur Wieder (West Germany)	10	68.0
Total		132.6
Total project financing (including infrastructure		203.6

Source: Ibid., p. 111.

4. Batong Buhay Copper Mine, Philippines: $200 million

Financing:	Development Bank of the Philippines Philippine National Bank
Equity:	Batong Buhay Gold Mines, Inc. 100% (owned by the Philippine government via the Dev. Bank of the Philippines - $200 million)
Management:	Philex Mining Company (Philippines)

Source: Survey of Mining Macroprojects.

5. Sierra Grande Iron Mine, Pellet Plant, Argentina
$116 million (72) - $400 million (79)

Equity:	Hierro Patagonico de Sierra Grande S.A. (Joint Venture Company) - Provincial government - National Development Banks - minor Swedish interests
Feasibility:	Sweko (Sweden), Widmark (Sweden)

Source: Survey of Mining Macroprojects.

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'Survey of Mining Macroprojects 1970-1982' was conducted by the author for this article, based on a scan of published sources; see first page of this article.

FINANCING COSTS AND ECONOMIC VIABILITY

Brian W. Mackenzie

Economically Viable Projects

In practice, economically viable projects are selected on an a priori basis, at the point in time when an investment decision is taken and mine financing is committed. Thus, an economically viable project is one which is perceived at that time to be sufficiently attractive to justify proceeding with financing and investment.

A wide range of evaluation techniques may be applied to support decisions on the selection of economic projects. These include the standard discounted cash flow methods, complemented by sensitivity and risk analyses. Assessment of cost competitiveness relative to other major suppliers in the marketplace may be used to provide further guidance.

Irrespective of the evaluation methods adopted, each investment decision ultimately reduces to a comparison between the return on investment offered by the mining project and the cost of investment funds required for its implementation. A project will only be selected as economically viable if the return offered is judged to be equal to or greater than the cost of capital being invested. The reason for using the cost of capital as the cut-off point when deciding whether to accept or reject a proposed mining project is fundamental. No company can afford to earn less on money invested than it has to pay for those funds.

Risk complicates this determination of economic viability somewhat. Looking out into the uncertain future, a mining project offers a wide range of possible returns on investment. Also, the cost of capital is in reality an uncertain estimate. Thus, a mining project will be selected as economic if there is considered to be a 'reasonable chance' that the return on investment will at least equal the cost of capital. What constitutes a 'reasonable chance' varies, from perhaps, 60 percent to 99 percent, depending on the risk preference of the mining company, and the size of the project in relation to the size of the company.

In any case, at both conceptual and practical levels, the economics of mining projects is based on a perceived relationship between return on investment and cost of capital. Thus, for projects, companies, and the industry overall, this relationship provides the primary constraint on mining finance requirements. In order to analyze how this constraint may be relaxed, the main factors which determine return on investment and cost of capital are now briefly examined.

Return on Investment

Mining projects represent possible demands for investment funds. For each particular project, return on investment is primarily determined by three sets of factors.

1. **Geological characteristics**: these include deposit location, depth, width, tonnage, grades, and the strength and competency characteristics of the ore and host rock. Typically, there is a high degree of variability in these geological factors among mineral deposits and, hence, among mining projects. Deteriorating geological conditions over time are a consequence of depletion and the systematic nature of mineral exploration.

2. **Market conditions**: comprising supply-demand-price relationships in the ultimate markets for the mineral commodities produced, marketing arrangements such as smelter contract terms, exchange rates, and transportation costs from mine to market. A distinction is usually made between short-term temporary market fluctuations and long-term permanent market trends, both of which are uncertain. Mining project economics is usually highly sensitive to these market factors.

3. **Technico-economic factors**: including currently available mining and mineral processing technologies, wage and salary rates, productivity, the unit costs of inter-industry inputs, and the general rate of inflation. Consideration is required here for environmental controls, and compliance with other mineral leasing and government policies which directly affect capital and operating costs. Relative changes in these technico-economic factors over time are important determinants of competitive position and economic viability.

For each mining project, information, experience and estimates relating to these three sets of factors are combined to determine the most appropriate project specifications, and to assess capital costs, revenues, and operating costs over the envisaged mine life. The end result is an estimated potential value or before-tax time distribution of cash flows for the mining project, usually expressed in real constant money terms. This time distribution of cash flow represents the anticipated return on investment for the project. The distribution may be summarized in various ways: for example, by the discounted cash flow rate of return on investment.

From a mining company viewpoint, the potential value assessment of return on investment must eventually be converted to an after-tax basis, introducing a fourth set of factors into the evaluation process.

4. **Mining taxation policies**: in Canada these include federal corporate income tax, provincial corporate income tax, and provincial mining tax systems. The anticipated inflation rate must be applied to correctly evaluate taxation effects. However, the after-tax time distribution of cash flows which is derived, reflecting return on investment, should once again be expressed in constant money terms. The after-tax distribution may also be summarized in terms of discounted cash flow criteria such as the rate of return on investment.

The constraint exercised on the demand for mine financing of a project, company, or the mining industry overall can be relaxed by enhancing the return on investment for mining projects. We can see that there are many possible ways in which this can be achieved, including concentration on the discovery of deposits with superior geological characteristics; improved mineral market conditions, especially higher commodity prices; technological and productivity advances; and the implementation of more efficient mining taxation systems.

Return on investment, as discussed above, does not in itself determine the economic viability of mining projects. Economic viability is based on the perceived relationship between return on investment and the cost of capital. This second cost determinant is now considered.

Cost of Capital

The cost of capital is determined by the sources of investment funds available for mining projects. While cost of capital is a complex subject, a summary of basic concepts will suffice here.

The 'weighted average cost of capital' is generally accepted as being the appropriate financing cost to apply in evaluating the economic viability of projects. Further, since it is seldom possible to realistically impute particular sources of funds to particular projects, this weighted average cost should be based on the cost of the total sources of funds available to the mining company which owns or otherwise stands behind the project. To be comparable to the return on investment evaluated, the cost of capital should be expressed in constant money terms.

The weighted average cost of capital is a function of the costs of individual sources of funds and the financial structure of the mining company. Funds may be obtained from a wide variety of sources but, for our purposes, these may be simply grouped into two types: debt and equity funds. Costs are estimated for each source. Then the financial structure of the company - basically, how much debt and how much equity it utilizes - is applied to assess the weighted average cost of capital.

The cost of debt funds is an explicit interest cost, nominated in current money terms. This explicit cost must be corrected for inflation. The constant money cost of debt funds in Canada is illustrated by the 3-percent average historical interest rate which has prevailed in the Canadian bond market. This real cost varies, being lower than average in times like the late 1970s when inflation increased unexpectedly, and higher than average in times such as the present when inflation is unexpectedly brought under control.

To the extent that interest payments are deductible for tax purposes, taxation affects the cost of debt funds. In Canada, interest is an allowable deduction for federal and provincial income tax, but not for provincial mining tax. Since combined income tax rates vary from 40 to 52 percent among the provinces and territories, the after-tax cost of debt funds is 48 to 60 percent of the nominal before-tax interest rate, assuming that sufficient income is available to expense these charges in the year incurred.

In summary, considering inflation and taxation effects, debt capital represents a low-cost source of funds, with constant money after-tax costs typically in the range of 1 to 3 percent, and seldom exceeding 5 percent.

The cost of equity funds is an implicit opportunity cost. Given limitations on the amount of investment funds available, the return on investment offered by a particular mining project must be at least as high as the return forgone on alternative opportunities.

The owners of a mining company have a wide range of opportunities available. If they are dissatisfied with company performance, they can sell their shares and reinvest elsewhere. Thus, the opportunity cost of equity funds from the shareholders' viewpoint is determined by the relationship between the present market price of shares and the future earnings expectations of the owners. The main difficulty in making such an assessment is the estimation of shareholders' expectations. Also, adjustments have to be made for relative risks among investment alternatives, and for taxation effects on dividend payments and capital gains.

Nevertheless, it is possible to estimate empirically the cost of equity capital from the owners' viewpoint. For example, in a 1981 study, Ball evaluated a cost of equity capital for Northern Mining Corporation, an Australian company primarily involved in diamond mining activities.[1] A most-likely current money cost of equity capital of 17.5 percent was obtained within a possible range of 15.7 to 20.9 percent. Adjusting for Ball's long-term Australian inflation rate projection of 10 percent, these results are equivalent to a most-likely constant money cost of equity capital of 6.8 percent within a possible range of 5.2 to 9.9 percent.

On an aggregate basis, the cost of equity capital for various sectors of the Australian economy is estimated and published on a quarterly basis.[2] For example, a current money cost of equity capital of 26.0 percent for the metals sector is estimated for March 1983. Applying the 10 percent long-term inflation rate estimate, this is equivalent to a 14.5-percent cost of equity capital in constant money terms.[3]

Evaluation of the cost of equity funds may also be approached from the managers' rather than from the shareholders' viewpoint. This may be a more realistic perspective when ownership of a company is widely held, and decision-making power has, as a consequence, shifted from shareholders to managers. In terms of managers' objectives, the implicit opportunity cost of equity capital is determined by the relatively restricted set of investment opportunities available within the company itself. Thus, the cost of equity funds from management's viewpoint is likely to be somewhat lower than for the shareholders, who have a wider range of investment opportunities available.

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1. 'Northern Mining Corporation NL: Estimate of a Discount Rate for Valuing Equity', Ray Ball, Australian Graduate School of Management, August 1981, unpublished.
2. These estimates reflect a consensus reached by staff of the Australian Graduate School of Management and BA Australia Limited and use data from the School's risk measurement service.
3. Alternatively, the constant money cost of equity capital rate, and 12.5 percent based on a 12-percent rate of inflation.

To summarize, the cost of individual sources of funds varies widely. The cost of debt capital is generally in the range of 1 to 3 percent. The cost of equity funds typically varies from 8 to 20 percent.

Knowledge of the financial structure of a mining company is combined with estimates of the costs of its individual sources of funds to evaluate the weighted average cost of capital. For example, a mining company financed with 40 percent debt funds costing 2 percent, and 60 percent equity capital costing 12 percent, would have a weighted average cost of capital, in constant money terms, of (.40)(2) + (.60)(12) = 8.0 percent.

In the illustrative case study which follows, a most-likely weighted average cost of capital of 8 percent is used, and the implications of a possible range of costs of 5 to 15 percent for the economic viability of mining projects are examined.

The economic viability of mining projects is dependent on the cost of capital. The constraint exercised on the demand for mining finance can be relaxed by improvements in the efficiency of capital markets and financing mechanisms, and by corporate strategies, government policies, and the management of financial institutions. Such factors would reduce the weighted average cost of capital for mining projects and make projects more viable.

The sensitivity of economic viability to possible changes in the cost of capital, as well as to key factors which affect return on investment, are analyzed in the following case study.

The Case of Base Metal Mining Projects in Canada

The return on investment, cost of capital, and economic viability considerations previously discussed can be illustrated using the case of Canadian base metal mining projects.

The assessment is based on 275 significant base metal deposits discovered in Canada to 1977. These are considered to represent the sum total of our base metal exploration, development, and mining experience. Most of these deposits have been developed and have produced. The others await possible future development. In any case, it is assumed that future mining projects will resemble, in economic terms, these 275 historical footprints.

Each of these deposits is evaluated as a mining project in the context of current economic and technological outlook conditions. Thus, the technico-economic factors discussed earlier as one of the main components of return on investment are standardized in this way. All values are expressed in constant mid-1983 values.[4]

The following expected long-term metal prices, in U.S. dollars, are used in the evaluation:

copper	1.15 per pound;
gold	550 per ounce;
lead	0.40 per pound;
molybdenum	6.00 per pound in concentrate;
silver	13 per ounce;
zinc	0.55 per pound;
exchange rate	0.80 U.S. $ per C$.

Initially, the potential or before-tax return on investment is assessed for each of the 275 mining projects, expressed in terms of their discounted cash flow rates of return. Rates of return for the projects are ordered from highest to lowest and plotted against the cumulative investment or financing requirement. The resulting investment demand schedule, presented in figure 1, provides a representation of return on investment for the Canadian base metal mining industry.

The variability in rate of return across the 275 mining projects[5] illustrates the high degree of variability of geological factors among base metal deposits. This point is further illustrated in table 1.

Under the assumed conditions, how many of these base metal projects would be economically viable and what would be the total financing requirement? As portrayed by the dashed lines in figure 1, if the weighted average cost of capital is 8 percent, 122 of the 275 projects would be economic, requiring a total investment of $13.4 billion.

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[4] Details of the data base and methodology may be found in Economic Effects of Smelter Controls on the Canadian Nonferrous Mining Industry, B.W. Mackenzie and M.L. Bilodeau, Technical Paper No. 2, (Kingston: Centre for Resource Studies, January 1982).

[5] Only those with rates of return of at least -10 percent are shown in figure 1.

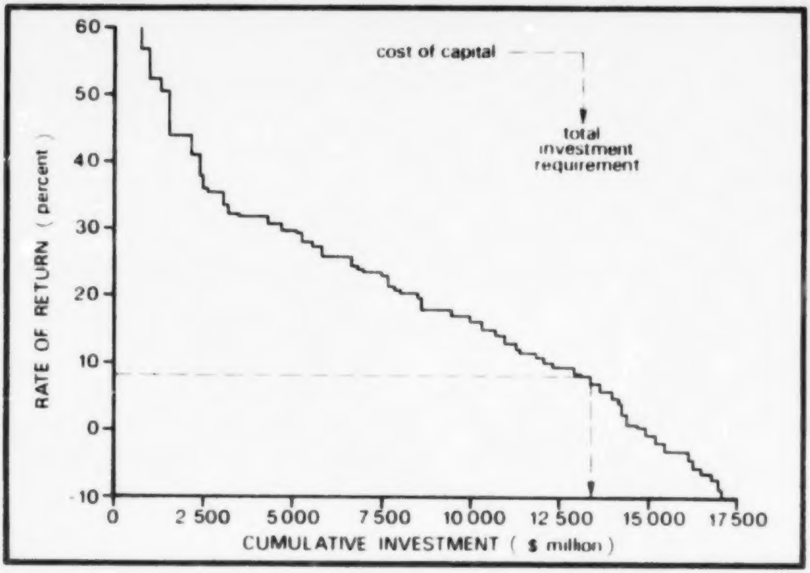

Figure 1. Relationship of Before-Tax Return on Investment to Cumulative Investment

Table 1

BEFORE-TAX RETURN ON INVESTMENT FOR CANADIAN BASE METAL MINING PROJECTS

Rate of Return Cut-Off (percent)	Number of Projects with Returns = Cut-Off	Total Investment Requirement ($ billion)
50	17	1.6
25	60	6.7
10	114	12.6
0	145	15.0
-10	169	17.1

Currently prevailing Canadian mining taxation systems are imposed on the potential or before-tax assessments to determine, in each case, the after-tax return on investment. An individual project (or stand alone) basis of taxation is assumed. Under these conditions, returns on investment are shifted down as illustrated by the after-tax investment demand curve in figure 2.

Imposing an 8-percent cost of capital, taxation reduces the number of economically viable projects from 122 to 98 (or, by 20 percent), and the total investment requirement from $13.4 billion to $11.0 billion (18 percent).[6] This highlights an important inefficiency in existing Canadian taxation policies, and illustrates their negative effect on mining finance.[7]

The effect of market factors on return on investment is shown by comparing after-tax results for expected value prices with those associated with present (January 1983) spot prices. Results are illustrated in figure 3.

If January 1983 spot prices were to prevail, and an 8-percent cost of capital is again assumed, there would be only 36 rather than 98 economically viable base metal projects (out of the total of 275 evaluated), and the total investment requirement would be reduced accordingly from $11.0 billion to $3.5 billion. Thus, the economic viability of mining projects is highly sensitive to market factors, particularly metal prices.

Finally, the effect of cost of capital on economic viability is portrayed in figure 4 for after-tax conditions.

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[6] For illustrative purposes, it is assumed here that the cost of capital remains at 8 percent, disregarding the effect of taxation on the terms of financing. Also, it should be noted that the risk associated with realizing the 'expected' return on investment is neglected. In reality, the minimum expected return would have to be set several points higher than the cost of capital to provide the required insurance that projects accepted would in fact be economic.

[7] This inefficiency could be eliminated by a taxation regime such as a rate-of-return taxation system, which allows for the recovery of cost of capital as a minimum acceptable return on investment before tax liability is incurred. Only under these conditions will the number of economically viable projects be identical before and after tax.

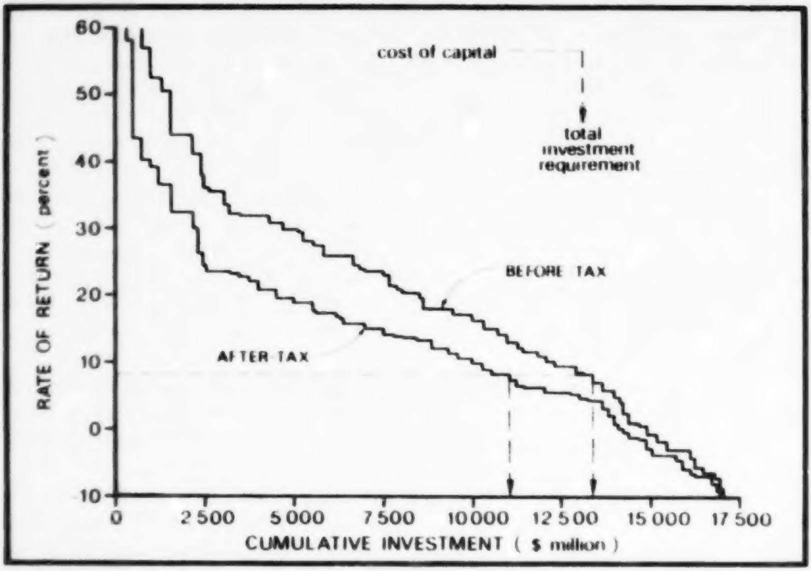

Figure 2. Effect of Taxation on Return on Investment and Economic Viability

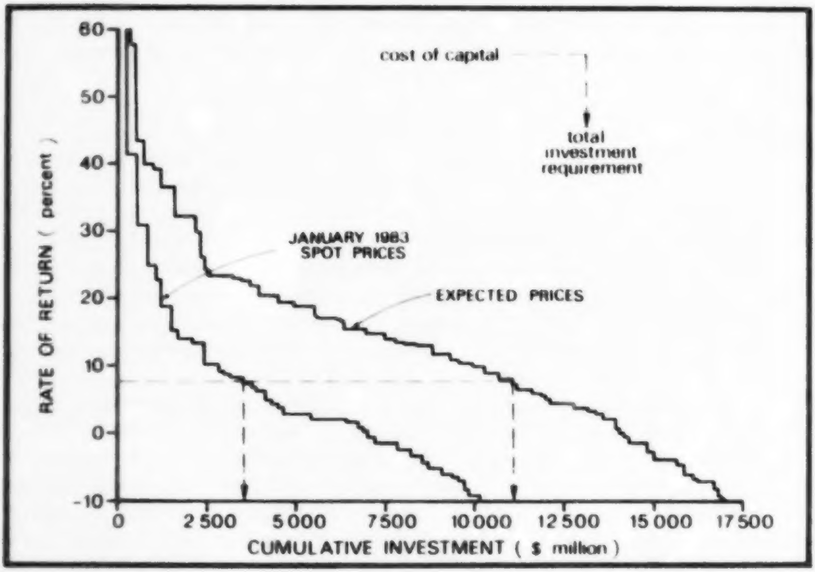

Figure 3. Effect of Metal Prices on After-Tax Return on Investment and Economic Viability

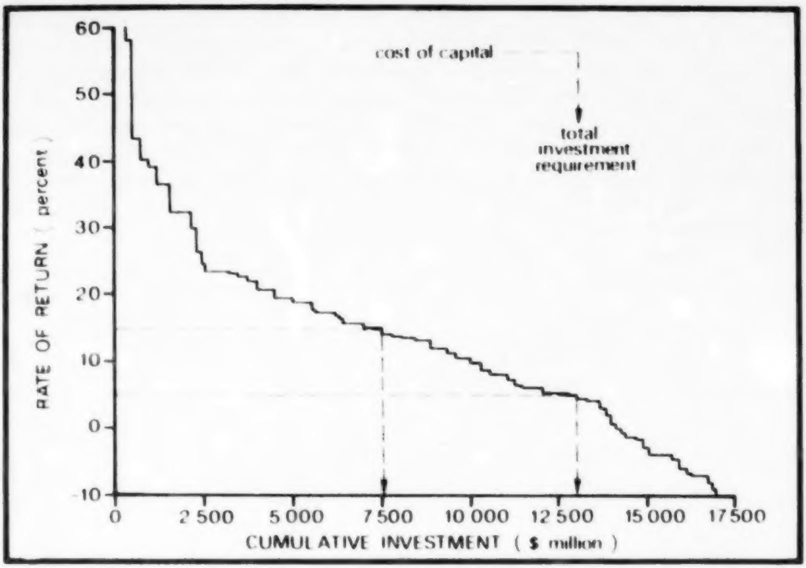

Figure 4. Effect of Cost of Capital on After-Tax Economic Viability

If one reduces the weighted average cost of capital from 15 to 5 percent, the number of economic projects increases from 67 to 116 (or, by 73 percent), and total financing requirements rise from $7.6 billion to $13.0 billion (72 percent). Thus, corporate and government policies which could result in modest reductions in financing costs would have a significant impact in stimulating mineral investment.

A number of key factors influencing the economic viability of mining projects and, thereby, the demands for mine financing have been examined above.[8] Geological characteristics, metal prices, and taxation regimes are shown to be important determinants in terms of their effects on return on investment. Technological advances and productivity improvements would have similar impacts. Economic viability and the demand for financing are also shown to be sensitive to possible changes in the cost of capital. Lowering the cost of mine finance, in other words, should have a significant effect on the growth and prosperity of the Canadian mining industry.

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[8] Further analysis of the economic viability of mining projects based on empirical investment demand schedules and measurement of the interest elasticity of investment demand may be found in Effects of Public Policy on Investment Demand: the Case of Taxation in Canadian Base Metal Mining, B.W. Mackenzie and C.H. Pye, Working Paper No. 26, (Kingston: Centre for Resource Studies, December 1982).

PART II THE PRESENT

THE ROLE OF GOVERNMENT

The Honourable Judy Erola

The subject of mine finance will be one of the key issues facing industry and government in this decade and I am therefore glad to be given a chance to address it. The issue is vital and needs to be approached in a comprehensive way, as is being done in this publication.

One is tempted to use as a theme a quotation from Sir John A. MacDonald, a man whose reputed capacity to yield to temptation is legendary. In view of the troubles recently endured by the mining industry, there is a remark by Sir John A. that comes close to the point. It's the line that goes: "when fortune empties her chamberpot on your head, smile and say 'we are going to have a summer shower'". While the quote indicates the problem, it does not suggest a solution. It is not, as they say, pro-active.

But to expect answers from the 1880s to problems of the 1980s may be expecting too much. As a first step towards finding today's answers to today's problems, let's review the situation facing the industry after the chamberpot incident.

Metal Markets

The World Bank is forecasting a significant recovery in real prices for base metals over the intermediate term. However, many industry experts, including Energy, Mines and Resources (EMR) officials, believe that global economic recovery will be painfully fragile. The consensus view seems to be that the trough of the downturn was reached in the second half of 1982. Most of the 1983/84 period will likely be an extended bottoming phase for metal markets. A probable scenario for the Canadian mining industry over the next couple of years is one of continuing struggle for corporate survival.

However, some favourable trends enhance prospects for a recovery and for a renewal of the industry's competitive position and profitability. To assess the outlook for competitiveness, it is necessary to take a look at the key cost components.

Unit Operating Costs

The liquidity crisis caused by high interest rates and declining operating profits forced many under-capitalized mining corporations to slash costs and increase productivity. In particular, employment costs have been substantially reduced by layoffs and rationalization measures. Other significant production costs are stabilizing as the general rate of inflation declines. Providing these gains can be consolidated, the Canadian mining industry should come out of this recession lean and tough. It will be more internationally competitive, particularly in terms of management-controllable operating costs. Significant reductions in unit operating costs will also come from increased use of capacity.

Relative Currency Exchange Rates

Eighty percent of Canadian mineral output is exported, making the exchange rate an important variable affecting competitiveness in a number of ways. The Canadian dollar has moved with the U.S. dollar and has been strong over the past year, rising against the currencies of some of our major mineral export competitors. As a consequence, the competitive position of Canadian mineral exports has been hurt - although it has reduced the cost of imported machinery and equipment.

However, many believe that this situation may soon reverse. The U.S. dollar could decline relative to other currencies and pull the Canadian dollar down with it. Such a development, particularly if coupled with a moderating domestic inflation rate, will enhance the profitability and export competitiveness of Canada's primary industries, including mining.

Tax Considerations

The industry's tax burden, which was the subject of some controversy in the 1970s, has eased as a result of the losses suffered in 1982. For tax purposes, the statutory time limits stipulate that losses can be carried back one year and forward five years (increased by the April 1983 budget to three and seven years respectively - editor). These losses will reduce the taxable income base and enhance corporate cash flows in the recovery period. On the other hand, as 1981 was not a particularly good year for mining, the industry will probably not be able to use large amounts of 1982 losses as carry-backs for cash refunds in 1983.

Capital Market Trends

I have touched on a number of cost factors here. It seems that there are grounds for optimism that the cost-price squeeze of the recent past may ease as mineral markets revive. This will help to alleviate the industry's severe liquidity squeeze, as will the recent decline in short-term interest rates. While still high by historical norms, the Canadian prime rate, which now stands at around 11.5 percent, has declined by more than 600 basis points since June 1982. Considerable pressure has been taken off those mining companies burdened with servicing heavy amounts of variable rate bank financing. Some analysts forecast a decline of a further 200 basis points or more in the near future, as inflationary expectations subside.

The decline in interest rates has also sparked a dramatic advance in the stock market, led by mining issues; betweeen June 1982 and March 1983, the TSE Corporate Industrial Index rose some 50 percent. The more that investors turn to stocks rather than money-market instruments and other fixed income securities, the more firms will be able to expand their equity base and stabilize their capital structures.

One must be careful, of course, to keep this issue in perspective. High debt/equity ratios are not a problem in themselves; they do present difficulties, however, when the debt service burden rises due to cyclically-depressed revenues and/or high interest rates. A more fundamental concern is the decline in the real rate of profit in the industry over the past decade - to which I shall be returning shortly.

Meanwhile, the Canadian mining industry has been in the process of raising several hundreds of millions of dollars in new equity financing. Prominent among the issuers are Inco, Cominco, Falconbridge and Sherritt Gordon.

I recently visited the Vancouver Stock Exchange and discussed risk-financing issues with officials of the British Columbia financial community. It certainly seems that the system regulating the financing of mineral entrepreneurship in Canada is improving and that further significant progress is in the offing.

Capital Investment Expenditures

The Canadian mining industry will probably devote most of its internally-generated funds to reliquefying balance sheets in the early course of the recovery. Consequently, it seems that very little of the funds raised through external equity financing will go into new capital investment. Indeed, the rate of major new capital investment in the industry will likely remain depressed until debt/equity ratios return to more healthy levels and until a high level of confidence in mineral futures is restored. The likely exception to this scenario is the gold sector where price expectations, despite some setbacks, are high and superior quality discoveries (for example, the Hemlo play) may justify new projects. Even here, though, there are major uncertainties, as evidenced by the present instability in the gold price. In general, capacity utilization rates in mining remain at very depressed levels, indicating that substantial increases in output will have to precede new investment.

International Mineral Finance

In the longer term, though, investment is crucial to the industry, not just to maintain or increase capacity but also to keep up with technological change. Furthermore, in order to increase the cost-competitiveness of the industry, new higher-grade mines will have to be found and developed. A revival of investment spending will depend in part on an adequate supply of funds from both domestic and foreign sources. One aspect of this issue is the ability of Canadian mining companies to compete with foreign mining ventures for the available funds.

Investment is undertaken with the expectation of earning a reasonable rate of return. In this respect, the Canadian mining industry suffers from a double disadvantage at present. First, the rate of return on investment in the industry, when adjusted for inflation, has shown a secu-

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1. For example: May 1982, Inco (common shares and warrants) $90 million; September 1982, Cominco (common shares and warrants) $50 million; November 1982, Inco (common shares and warrants) $68 million; December 1982, Falconbridge (common shares and warrants) $89 million; January 1983, Teck Corporation (common shares and warrants) $27 million.

lar decline through the 1970s, reflecting a decline in overall competitiveness and a growing cost-price squeeze. At the same time, the level of real investment in the industry fell from a peak in the early 1970s. I am optimistic that profitability will improve as the market recovers, thus increasing the incentive to invest in Canadian mining.

The second disadvantage, however, will likely be around for much longer. This is associated with possible distortions of the true profitability of mining projects overseas by the actions of foreign governments on the one hand, and international aid or lending institutions on the other. The last decade has seen a gradual shift in the pattern of mining investment internationally, as the less developed countries have increased their overall share of capacity. This is partly a reflection of mineral endowments, coupled with growing global demand.

It also reflects, however, the trend towards participation in mining projects by many of the governments involved, and the resulting de-emphasis of straight profit-maximization in their decision making. Because of the importance they attach to such projects as sources of foreign exchange and employment, governments in developing (as well as the centrally-planned) economies have shown a willingness to subsidize projects to add to capacity and to expand production - even in periods like the present, when declining world prices have been signalling the need to cut back.

I also mentioned international financial institutions as a source of distortion. The debt repayment problems recently encountered by a number of less developed countries (LDCs) have prompted the rescheduling of loans, thus effectively reducing the capital costs of projects. At the same time, by refraining from coordinating their aid programs or lending activities with the cyclical movements of mineral markets, international institutions have, in certain cases, exacerbated those market movements.

The actions of foreign governments and international lending and aid institutions are beyond our control. We have little influence on either the global competitive environment or world prices. But there are aspects of mine financing on which action can be taken. I would like to discuss briefly the potential for federal government action and the constraints which may limit that action.

The Role of Government: Opportunities and Constraints

I am aware that many people in the industry have very definite views and preferences on the role of government. On my side, I need persuasive arguments, if I am to make a special case for government measures to enhance mining. The question often asked is 'why not manufacturing, or hi-tech?'. The mining industry has demonstrated in the past that it is capable of healthy and sustained growth in a suitable environment. Our concern here is with specific measures that might make mining more attractive as an area in which to invest. During my tenure as Minister of State for Mines[2], we have made advances in giving mining a better tax break. For instance, the November 1981 Budget speech announced an improvement in the provision for flow-through shares, sold for the purposes of raising exploration funds; as of that date, the proceeds realized by investors from the sale of such shares will be treated as a capital gain.[3] This change was based on a legitimate agrument to correct an inequity in the tax system. I do not propose to list here the range of measures introduced to make mine financing easier, but I think they are significant. They are appended to this article.

Taxation and Jurisdiction

We all agree that the tax system is overly complex. With 13 jurisdictions, it isn't easy to simplify the system, nor is it easy for governments to use changes in taxes to achieve policy objectives.

Let me give you an example. In October 1980, a special federal investment tax credit of 50 percent was initiated to encourage investment in 'manufacturing and processing' in designated regions. Under the Regional Development Incentives Act and Regulations, 'manufacturing and processing' can cover milling, smelting and refining

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2. The paper was written before Mrs. Erola moved from the Department of Energy, Mines and Resources to become Minister of Consumer and Corporate Affairs.
3. The Budget of April 1983 further improved the industry's ability to make better use of the flow-through share and joint exploration corporation provisions in the Income Tax Act (editor).

facilities. Unfortunately, less than 100 percent of this federal measure to ease mineral financing is received by the investing company. Some of the benefits of a reduction in capital costs created by the investment tax credit are taken by the provincial governments in income taxes. But we should make note of the Federal-Provincial Resource Taxation Agreement that was reached at the 1978 First Ministers' Conference on the economy. That agreement was instrumental in stabilizing the tax system and removing much of the volatility and uncertainty of the previous decade.

FIRA

In relation to investment, I would like to say something about FIRA and its relevance to the financing of mineral ventures in Canada. Foreign capital has played a major role in the past in the development of Canada's natural resources, including mining. I am certain that we will continue to rely significantly on foreign investment, both direct and portfolio.

Portfolio investment does not come under the purview of the FIRA legislation. Thus, there is free movement of loan capital for mine financing. Indeed, portfolio capital, particularly corporate bond issues, has steadily increased its share of total capital inflows.

Foreign direct investment is reviewable only if it involves:

i the takeover of control of an existing Canadian business;
ii diversification into an unrelated line of business.

This in fact encompasses only a small portion of foreign direct investment in Canada. The FIRA legislation aims to ensure that foreign investment is likely to yield significant benefit to Canada. In response to criticism, the review process has been considerably simplified by recent changes, such as the raising of the threshold firm size and measures to speed the processing of applications.

To whatever extent some members of the foreign investment community may still be wary of FIRA, it is my goal to convince them that Canada is a hospitable as well as uniquely attractive place to pursue mineral opportunities.

Lortie Committee Report

Inflation has been another critical factor affecting the stability of the fiscal, financial and investment environment for mining in Canada. The distortions caused by inflation are well documented. These include:

i mismeasurement of real income from capital, due to the application of generally accepted accounting principles based on historical cost;
ii distorted determination of income tax liabilities;
iii inflation-induced distortions in both real and nominal rates of interest;
iv taxation of inflation-induced capital gains.

In 1982, the federal government took strong initiatives to address the problem of inflation-linked distortions by appointing a private sector committee (the Lortie Committee) to examine a series of proposals on Inflation and the Taxation of Personal Investment Income. Last September, the Lortie Committee tabled its report which recommended, among other things, the adoption of a modified form of the Registered Shareholder Investment Plan (RSIP) proposal for listed common shares. This constitutes a partial approach to exempting the inflation component of capital gains from taxation. I think most would agree that the RSIP proposal[4] could prove to be a very progressive move towards stimulating growth of Canada's equity capital markets.

While I cannot comment on specific actions the government might ultimately take in response to the Commission's recommendations, I am certainly open to suggestions on how to encourage the flow of savings into Canadian mineral investment ventures.

After-Tax Financing

The concept of after-tax financing is fairly straightforward. Interest on the instrument is treated by the lender as dividend proceeds for income tax purposes. Dividends received by corporations, including banks and other lending institutions, are not taxable. Therefore, non-taxable corporate borrowers could be provided with loan capital at significantly reduced rates.

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[4] Since put into effect as the Indexed Security Investment Plan, or ISIP (editor).

It has been pointed out by proponents of after-tax financing that the effective reduction in the cost of capital could mean the difference between a new mine being shelved or getting the green light. It has also been suggested that, to a junior mining company, after-tax financing could be the difference between proceeding with a development independently or relinquishing control of an ore deposit to a major resource corporation.

After-tax financing instruments are, of course, not new to Canada. Until their use was severely restricted by the Budget of November 16, 1978, after-tax financing instruments in the forms of 'income debentures' and 'retractable, term preferred shares' were a popular mode of financing. The restrictions on their use were imposed because they were being used too extensively to finance nonproductive investment activities. For example, major corporations were using them to finance takeovers of other corporations. Canadian chartered banks were perceived to be avoiding their fair share of income taxes in the process. By 1978, foregone tax revenues stemming from after-tax financing activities were estimated to be running at about $500 million annually and climbing.

So there is little doubt that the after-tax financing system was abused at a cost of significant foregone income tax revenues. There have been suggestions that the concept should be revived, and I would welcome suggestions on the topic.

Foreign Banks in Canada

I would like to touch for a moment on aspects of the Canadian banking system. The Bank Act of December 1980 was intended to open the door to increased foreign competition while at the same time bringing under federal jurisdiction the range of foreign-owned 'near-banks' already operating in the country. So as not to shock the system too severely, foreign subsidiaries have been subjected to fairly tight restrictions, designed to keep them initially to an 8 percent share of the total domestic assets of the banking system.

These and other regulations have served to restrict the foreign subsidiaries primarily to the market for small and medium commercial loans. Their impact will be smaller in the market for larger loans, with their participation being predominantly in the form of loan syndication with Canadian banks (see Bradly paper below, for a different view - editor). They will continue to be important, however, as representatives of the parent bank, arranging loans by the parent for Canadian borrowers.

Foreign banks have been active in the past in searching out mineral investments in Canada. Is their future role likely to be significant? Foreign subsidiaries seem set to increase their share of the market for smaller loans. Meanwhile, our attractive investment opportunities, combined with the stability of the Canadian political and economic environment, should continue to encourage an inflow of capital from abroad, particularly by the large international banks.

Concessional Financing

I would also like to address some of the recent actions taken by national governments in the developed countries to subsidize exports and to promote investment in the non-fuel minerals industries of the developing countries.

Officially, the OECD laid down export financing guidelines in 1976. However, when interest rates began to rise, some governments conveniently forgot to raise export credit rates. Some western European countries offered heavy minerals-related subsidies, while other trading nations granted their exporters unusually long-term credits.

For some time, Canada has been striving to achieve reasonable equilibrium in export financing by negotiating an international agreement which would reduce the use of subsidies in competing countries' export financing programs. In the absence of any real progress in attaining an international agreement, and because Canada would continue to lose business as a result of foreign financing competition, the government decided in 1980 to provide, through the Export Development Corporation, a facility which would be available to countervail 'credit mixte' financing by other countries. 'Credit mixte', as you know, differs from conventional export financing in that it mixes a portion of the financing at rates typically less than 4 percent with the balance at conventional export financing rates, to produce a very low effective interest rate on the combined credit. Export transactions which do not involve the identifiable presence of 'credit mixte' competition continue to be supported by EDC through its traditional loan facilities.

There is no long-term solution to the problem of concessional financing other than the complete withdrawal of this subsidy element from the international scene. To be realistic, however, we will have to look for imaginative solutions that would partly relieve Canadian mining projects from the unfair competition of 'credit mixte' subsidization. One possible route, for instance, might be the increased use of long-term contracts, such as the arrangement between the B.C. coal suppliers and their Japanese customers. I would certainly welcome realistic suggestions on what would be required to alleviate these various difficulties.

Mineral Priorities in the 1980s

The foremost issue requiring federal government attention in the 1980s will be the fragile state of Canada's mineral industry. This is reflected in declining market share, in mine closures and cut-backs, and in unprecedented levels of unemployment. Indeed, it is imperative that federal and provincial governments develop and implement new measures to enhance the productivity and international competitive position of the mineral industry. At the same time, the economic base of mining communities must be strengthened and diversified, based on cooperation between industry and the various levels of government involved. Continuing discussions are being held with my provincial colleagues, as well as with the private sector, in an effort to develop mining.

Two priority areas mentioned in the Mineral Policy Discussion Paper of 1982 were the junior mining sector, to which I referred earlier, and the overall investment climate in Canada. The ongoing consultative and policy research efforts of my department are designed to correct legislative biases, administrative inefficiencies, and inequities in our taxation and foreign ownership policies. In cooperation with the provinces, we remain strongly committed to maintaining an overall policy environment which is conducive to investment in exploration, mine development, and mineral processing.

But the federal government also remains committed to the belief that national mineral policy should continue to embrace a principle of 'laissez-faire' economics. This means a minimum of government intervention. However, I do repeat that Ottawa is receptive to suggestions as to how the taxation system, or other national policies and programs, can be adjusted to promote optimal levels and quality of mineral investment in Canada. Some flexibility may be called for, in recognition both of the risks associated with mining in general and of the particular characteristics of individual projects. These considerations stem from, among other things, the inherent volatility of mineral prices and revenues and the high fixed costs of developing increasingly inaccessible deposits.

At the same time, we must recognize the limitations on what the government can achieve in this area, given that mineral prices and demand are the ultimate determinants of investment. I am confident that the industry will continue in its long tradition of innovation and self-reliance, and that the ideas presented in this publication will help it to do so.

Appendix

Making Mine Financing Easier

Over the past four years the Government of Canada has not only been concerned about making mine financing easier but has been doing something about it. Examples are as follows.

1. In 1978, development expenditures at a new mine were accorded the same treatment as CEE; they could be written off to the extent of income or at 100 percent. Previously, they were written off on a 30-percent declining balance basis.

2. The acquisition cost of mining properties can not only be written off on a 30-percent declining balance basis, but the expenditure is deducted after the resource allowance, which raises its impact.

3. Expenditures on 'social assets' at a new mine, or connected with a major expansion, have been allowed to earn depletion in recent years.

4. Also in recent years, expenditures on mining exploration may be written off against any income. This provision has been extended indefinitely.

5. In the November 1981 Budget the provisions for flow-through shares sold for the purposes of raising exploration funds were improved. As of that date, the proceeds realized by investors from the sale of such shares will be treated as a capital gain rather than as inventory, as in the past.

6. In October 1980, a special federal investment tax credit of 50 percent was initiated to encourage investment in 'manufacturing and processing' in designated regions. Manufacturing and processing, as defined under the Regional Development Incentives Act and Regulations, are used as the basis for this incentive. It is much broader than the definition under the Income Tax Act and can cover smelting and refining facilities and, in some cases, part of a mill.

7. Federal-provincial mining officials carried out an 8-month study in 1982 on the junior mining industry. A number of options were suggested to help junior mining companies finance their activities. Since then, further examinations of these options have been carried out and it is hoped that some of them will be adopted in the near future. Although the Prospectors and Developers Association was not involved in the federal-provincial study on junior mining, a number of meetings were held with them to discuss their views and recommendations. On many points the Junior Mining Task Force and the PDA are not far apart.

THE DEMAND FOR MINE FINANCE: CANADIAN PERSPECTIVES

Patrick MacCulloch and David Yudelman

Context

In the 25 years of Western-world reconstruction that followed World War II, demand for minerals grew at twice its historic rate and on a world-wide basis the mining industry responded by greatly expanding its productive capacity. In Canada an average of 15 new mines was commissioned annually. Then came the twin phenomena of downsizing industrial products because of energy costs and a virtual revolution in the technologies that governed the usage of metals.

The result today is that on a world-wide basis the mining industry has production capacity in excess of current demand and faces, at best, a period of restrained growth in demand for its products. The pressure is thus on the supply side of the industry, and any new mines brought on stream must be low-cost producers. This means that the capital servicing component of their costs must be low.

Changing patterns of industrialization in the world and material substitutions derived from changing technologies make demand and price forecasting more than usually unreliable. In addition, for a metal like copper, government control of some 47 percent of world capacity means that decisions to enter into production or to change production rates are not driven by normal market considerations, and even wilder price fluctuations result. The industry therefore confronts a greater problem than hitherto in justifying future investment.

Mining companies in Canada face these problems very acutely. Canadian mines thrived while buoyant demand supported buoyant prices, but many of them are mines which are low grade and high cost by world standards. Now demand is sated and prices have plummeted. The future corporate prosperity, if not the survival, of Canadian mining companies requires that current mines be replaced by new mines offering better profit margins. The companies, however, have already suffered a major weakening in their financial strength through the combination of high interest rates and low product prices encountered during 1981 and 1982. Their need for new funds thus goes beyond new projects. The companies are already over-borrowed relative to current earning levels; in fact, in the nine months to 30

September 1982, eight of Canada's largest mining companies as a group failed to earn enough cash to pay the interest on their debt. They need funds to recapitalize themselves as well as to provide capital for new projects.

The theme of this paper is to suggest that these needs are interlinked and that they must be addressed together. It is further suggested that, if a supportive investment and tax environment is to be provided within which the mining companies and financial institutions can secure the new capital funding required, some action is warranted at the federal and provincial government levels. A series of suggestions, some conventional, some unconventional, is made below. Nor should the industry confine itself to asking for help from governments and financial institutions outside. It can and should do more to help itself.

What can the mining industry do for itself?

First, the industry must pay more attention to the position which a projected orebody will occupy both within the world spectrum of producers and within the part of the spectrum of producers that is controlled by normal market forces. In the smaller, highly competitive mining industry which will probably be the pattern in future, good mine grades with low cost characteristics offering substantial operating margins will be essential. Second, it should avoid large, capital-intensive, low-grade deposits for the same reasons. Smaller high-grade mines will be more attractive. If reliance is to be placed on loan financing, mines should be initially developed at the lowest production rate that makes them self-funding. The greater debt/equity ratio and the search for higher nominal rates of return which accompany debt finance have forced the development of mines at greater initial production capacities than normal commercial caution and the technical characteristics of the orebody might otherwise dictate.

There are a number of other possibilities of varying degrees of importance and feasibility, which mining companies should thoroughly investigate. Some of these are:

i assigning some or all of the completion guarantee risks to the engineering firms engaged by developers to produce construction and development cost estimates;
ii negotiating fixed price construction contracts;
iii investigating different product sales arrangements that reduce or eliminate exposure to commodity exchange pricing (which values the bulk of production at the margin, thus accentuating the volatility of prices);

iv returning to traditional producer pricing or, better still, moving to individual supplier/consumer contracts. The latter would permit raising finance from consumers with long-term production loans based on fixed price take or pay contracts. Here the financial institutions should be useful intermediaries;

v making more use of leasing techniques where possible. The leases should be collateralized against the equipment rather than using up the companies' available credit.

Overall, the mining companies must make a determined and concerted effort to return to the far more conservative debt/equity ratios that prevailed before the 1960s. They must raise a larger proportion of equity than recently for new projects. The objective, and the imperative, is to reduce the adverse combined effect of volatile prices and variable interest rates. This is where the industry turns to the financial institutions.

What does the mining industry need from financial institutions?

The financial institutions referred to below are, loosely, the chartered banks, the investment banks and the securities industry. They play an important role in channelling investor and venture capital to the mining industry, but they could be doing more.

First, they should facilitate a more regular and stable supply of equity-type funds for mine development. The fact that early 1983 brought a number of major mining company equity issues should not make us forget that such issues were largely impossible throughout most of the previous 12 years (see Gillin's paper). This need for equity capital means further development of special financing packages to be retailed to the public through the securities markets when straight equity issues are out of favour. Special features would range from conversion rights on debt issues, and equity rights, to combined share and drill-fund-type tax units. There is also an urgent need to ease the burden in the area of securities regulations, which has significantly reduced the availability of risk capital (particularly for smaller companies) and increased its cost.

Turning to the debt area, the prime need is for long term (10, 15, or more years) fixed-interest money to remove capital cost servicing risks. The last year has shown the danger to mining companies of the combination of volatile product prices and volatile interest rates. Perhaps we will see more lenders requiring an equity 'coupon' on their loan, which they can cash in to advance and increase the return they receive on the money they loan. Risk reduction measures to permit the lowering of loan rates need to be reviewed.

The long lead times for mine development require loan agreements providing for deferral of principal payments, preferably with interest roll-up provisions until the loans can be serviced from production revenue. Such agreements should be designed to alleviate the 'front-end loading' effect of financing in an inflationary environment (see paper by Kalymon).

Bankers Acceptances are potentially important instruments, for two reasons: first, they permit a net reduction in loan costs by providing a bank guarantee of the borrower's credit; second, they could permit a significant broadening in the source of funding for mine development. A broader spectrum of commercial lenders, unfamiliar with mining risks, could be brought to the market. Currently there are vast pools of investment capital in institutions like insurance companies and pension funds that are only partially available for mining industry purposes (see paper by Sultan).

Among other loan instruments which should be explored are:

i long-term fixed-interest debt with variable amortization schedules available at the borrower's option to provide optimum matching of debt repayment with actual realized project cash flow;

ii long-term fixed-interest loans with currency switching options;

iii loan agreements with progressive release of borrowers' guarantees;

iv loan agreements with principal repayments denominated in the product to be produced. This may be viable for gold and silver only. Equity can also be raised with the dividends denominated in the product to be produced (see paper by Gillin).

The financial institutions can only support the needs of the mining industry to the extent that Canada, its territories, and its provinces are perceived to be offering a fair and favourable environment for investors. Here the institutions can help in advising government of ways in which it can aid and encourage investment. The broad perspective and political leverage of the financial institutions can help in identifying and emphasising new taxation and financial measures that governments would find politically acceptable. The institutions are in a unique position to serve the national interest as well as the mining industry by facilitating and encouraging the flow of scarce venture capital from abroad.

What can the mining industry ask of government?

The industry should avoid asking for hand-outs or free lunches, and should attempt to confine its requests to government to those areas where government policy affects mining companies in ways that the companies themselves are powerless to offset. In such areas government actions carry with them government responsibility to address their consequences to Canadian producers. This requires the coordination of federal and provincial government policies.

Any consideration of the near-term survival and future prosperity of the Canadian mining industry has to start with the business environment. The industry needs government to formulate a clear and coherent national policy on resource development that will create a stable business environment in which all the participants in the mineral area can plan their future. For the last few years the industry has been receiving confusing and contradictory signals. In asking for a coherent national resources policy, it is looking to both the federal and provincial levels of governments to jointly provide a stable and attractive environment for investment in mining in Canada.

This policy for resources should reflect:

i economic considerations such as the role played by mining in Canada's export and balance of payments picture as well as its role in the economy as a whole;
ii social considerations such as the role of mining in creating direct and indirect employment throughout the Canadian north, as well as its environmental impact;
iii considerations of sovereignty and national security.

Clear and stable rules should be promulgated as to how Canada's mineral resources may be developed by both domestic and foreign investors. In short, it is up to government to consider whether it is in the national interest to back the mining industry actively (as virtually all its competitors are backed throughout the world) or to ignore the industry's disabilities and disadvantages in the world (some of which are the responsibility of government rather than of the industry or natural endowment). Either way, government should announce its decision and its rationale clearly, and then implement it in a stable and coherent manner.

There is a strong case that the mining industry's contribution to the Canadian economy is such that it is in the national interest that the industry be treated at least as well by its government as its competitors are by theirs (see Bradly's paper). The industry's geographic location in Canada's north, its foundation upon Canada's natural resources, and its exposure to the forces of world markets, mean, some would argue, that mining can be regarded as a special sector of the national economy. Governments, in their own interests, should at least deal with the unique nature of its problems. For reasons of the national interest, Canada can ill afford to let the industry's international competitiveness slip.

Turning from the general business environment to the specific tax regime for Canadian mining, it should be conceded that the general perception of the situation may well be worse than the facts warrant. The rate of taxation of the mining industry began to increase in the late 1960s, and the tax regime for mining continued to deteriorate through the federal/provincial quarrels of the early 1970s until about 1977. The 1978 Federal-Provincial Resource Taxation Review did much to stabilize the situation and since then there seems to have been a considerable measure of stability in resource taxation. Unfortunately, since the mid-1970s, attempts to fine-tune the general tax regime have destroyed the general perception of stability and predictability that is necessary for investor confidence. While it is certainly true to say that mining is not treated nearly as well now as it was at the end of the 1960s, it does have a tax regime that compares with that prevailing in many other countries. Nevertheless, the regime is in some cases failing to address the specific areas in which investment in Canadian mining can be encouraged, and is threatening the health and viability of the industry, as well as failing to optimize long-term government revenue from the industry.

The favourable elements of the Canadian system are the availability of immediate write-offs on exploration and development expenses and, to a lesser extent, the earned depletion and resource allowances (though some of Canada's major competitors have even better schemes: for examples, see Glenshaw's paper).

There are several tax areas which government might usefully address.

i It should consider making the full Canadian exploration expenses allowance available at the time of investment rather than at the time of expenditure.

ii It should remove the limit on the applicability of earned depletion so that it can be utilized to the full extent that taxable income is available (the April 1983 Budget made improvements in this regard - editor).

iii The principle of consolidated tax calculations, already in effect to a limited extent with the Joint Exploration Company regulation, should be fully implemented. This one measure could divert a significant amount of mining company expenditures from taxation lawyers to exploration.

The effective tax rate on mining is of course important, this being the sum of federal and provincial levies. An important related advantage would also be the development of a common base for taxable income in the various jurisdictions. Investors have lost confidence in their ability to make long-term investments in Canada without exposure to the danger of radical and occasionally retroactive changes to the taxed portion of the reward they seek. Particularly for megaprojects, this may require that we move to a system of individual project-specific tax treaties or agreements between government and mine owners to insure the latter against future damaging tax changes.

An interesting variation of this, which avoids many of the risks and undesirable features of individual tax treaties, is being tried in Chile. In this case, instead of the tax treaty specifying a special tax status for a specific property, it simply guarantees that however the general tax regime changes in the future, the application of the existing tax rules to the specific project will be frozen and will not change. This measure should be politically acceptable to governments since it does not discriminate between taxpayers on a current basis, as individual tax treaties might.

The 1982 results of 15 Canadian mining companies, large and small, reported by the Financial Post, are striking. Four made net profits totalling $110 million but the remaining 11 together made losses totalling $476 million. Even our large companies are suffering to the extent that direct tax concessions will be of little benefit in encouraging investment. The ability to 'flow through' tax allowances, i.e. to pass the benefits on to the providers of finance, would have a two-fold beneficial effect: first, by increasing the supply of available capital to the industry; and second, by reducing the cost of that capital. Politically acceptable ways of achieving this must be devised, and the financial institutions need to be more creative and forward looking in developing instruments that governments will find acceptable (the 1983 Budget made improvements in this area, but more could be done to create after-tax financing opportunities for all companies - editor).

A key point, perhaps the key point, of mining taxation policy is the encouragement of new mining. There will be little tax revenue from Canadian mining unless more and better mines are found. Therefore a prime objective of the tax system must be to encourage exploration and to encourage mine development. Thus there is a serious argument for restoring the prospector's freedom from capital gains taxation upon the sale of a find, and for exempting from capital gains taxation any profit made by the original purchaser of treasury stock issued to finance exploration or the construction and development of new mines. High-risk venture capital can only be attracted by offering the possibility, however remote, of occasional high returns.

In discussing both mineral policy and mineral taxation, the constant emphasis has been on the need for stable policies. The investment climate in Canada has been harmed by the ebb and flow of continuous legislative and regulatory changes in the 1970s, and by the feuding between federal and provincial governments in which the health of the industry - and the national interest - has all too often been ignored.

Returning to the issue of regional development and, more specifically, development of Canada's northern lands, it is recognized that the problem of the role to be played by government is complex. The mining industry cannot and should not ask for taxpayers' money to subsidize development of northern deposits which would otherwise be uneconomic. On the other hand, if government, for its own reasons, has a general policy to maintain and encourage regional and northern development, it equally cannot and should not expect the investor in mining projects to subsidize government programs.

Frequently, both parties will be the clear beneficiary of a northern development project, and some protracted horse-trading may be required. The mining industry's attitude on this has been that both federal and provincial governments are vocal supporters of northern development in public. If they mean what they say, they should be prepared to provide a reasonable infrastructure - roads, hydro, water, sewage, employee housing, schools and hospitals - to enable pioneer northern developers to operate. If government does not mean what it says about northern development, it must say so openly and face the political consequences.

The justifications offered for northern and regional development are usually social and political. In this case, however, there are also extremely sound economic justifications for opening up the north. About 40 percent of Canada lies north of 60, but only 3 percent of its mines are located there. The reason for this has nothing to do with mineral potential; it has everything to do with the north's competitive disadvantages and lack of infrastructure. A concerted effort by government to reverse this might not produce immediate political gains, but it is one of the key policies essential to the continued viability of Canada's mining industry. It could ultimately produce dazzling economic benefits for both government and industry.

It was suggested above that Canada's government should evaluate its incentives to mining in the light of what Canada's competitors were offered by their governments. There is another aspect to this problem. Most governments, including the Canadian governments through CIDA and EDC, provide direct loan financing at less than market rates for overseas projects involving the export of domestically produced equipment and services. In the extreme case we have seen EDC endeavouring with low cost loans to facilitate the development of a major copper mine in Panama, the result of which might be to displace production from existing Canadian mines. Can we not turn this policy around? Should not the government be prepared to provide the same low-cost loan facilities or loan guarantees for domestic mines and plants which will generate mineral and metal exports for Canada? Should not CIDA perhaps direct some of its assistance programs at developing markets in the third world for Canadian mining products as well as Canadian manufactured products?

Exchange rate fluctuations (particularly the U.S./Canadian rate) play a large role in determining the actual price received by Canadian producers under current marketing arrangements. Since it is the government and its central bank which between them effectively govern exchange rates, the government might consider providing long-term guarantees to developers of new mines, protecting them against some of the effects of adverse rate changes on the price they receive for their products on international markets.

Please note the character of the suggestions put forward. They are not measures that are aimed at subsidizing operations or creating any other long-term disruption of normal market forces. They are measures specifically aimed at fixing and reducing the cost of capital for new mines. The measures suggested are therefore envisaged as being in effect only through the capital payback period; once the capital and interest thereon had been recovered, tax would be levied on the project at an appropriate rate to reimburse the government for the guarantees and insurance it provided.

Conclusion

Canada's mineral and human endowments are rich enough for Canadian mining to be competitive in the world-wide industry. Canadian mining can and should continue to contribute to the wealth of this country. To do so it needs an investment environment that is perceived to be equitable, attractive, and stable enough to encourage the kind of long-term relatively high-risk funding that mining requires. The perception of Canada as that kind of place has been eroded and needs to be restored by all concerned.

If it is clearly understood by investors and mining companies that Canada wants northern development, and is prepared to encourage and reward investment in the north, then mine developers and financial institutions will be able to find the means to finance the industry while at the same time avoiding the mistakes of the seventies. In spite of the gloom of the present, the north could prove to be the saviour of Canada's mining industry in the longer term, given courage and persistence in the industry, and vision in governments.

As for the Canadian mining producers, nothing concentrates the mind on past mistakes and future requirements for survival like the situation of having more than half the mines closed down and 60 percent of the work force unemployed, as was the case in the fall of 1982. Low operating costs will be essential, and a significant component of such costs is the cost of servicing capital. A pivotal need is for competitive-rate, limited-recourse, fixed-rate, long-term borrowing instruments.

Government's crucial role is to provide the environment in which the financial institutions can deliver the new financing the industry requires. Canadian mining has the resilience and the ability to reward fully both those who invest in it and the governments that make such investment possible.

SUPPLY OF FINANCE: INTERNATIONAL PERSPECTIVE

Peter Glenshaw

The world of international finance views the Canadian mining industry with serious reservations except for one or two special cases. It is useful to step back and try to see why this is the case. It is also instructive to examine mining industry cases in other countries which continue to thrive and to attract international financing despite facing potentially greater problems than those faced in Canada. Finally, I would like to present some questions which I feel Canada must answer if it is to make its mines more attractive for international finance.

Categories of Mines

From the point of view of the international financier, mines and mineral development fall into one of three categories.

Monetized Metals

These are the mines producing silver and gold. Although these metals are not formally monetized at present, more and more links are being made between them and money. Gold, and to a lesser extent silver, are explicitly recognized in international financial markets as something quite different from copper, oil, lead, nickel, phosphates and other minerals. The prices of gold and silver are set by their value as a store of wealth that can easily be converted into a medium of exchange or money, and not by simple supply and demand forces. Prices of gold and silver are likely to rise continuously as the links with money are made more formal and as world trade again picks up. Supply and demand in the classical sense hardly enter the equation, as the supply of gold is fixed for all practical purposes. The world stock of some two and a half billion ounces is never consumed and is hardly affected by the annual addition of some twenty-five million ounces of newly mined gold. The new supply is further reduced by physical losses for things such as dentistry, industry, and 'sentimental jewelry', which will never be sold. Gold and silver are likely to remain of great interest to investors and the world over for a long time to come.

Tradeable Minerals

They comprise the energy minerals like oil and coal, the base metals and their ores (iron, copper, nickel and so on), the fertilizer minerals and their products, such as phosphate rock, phosphoric acid, sulphur and potash, and some others like barite and asbestos. These minerals and their derivations move extensively in world trade. They are actively sought by nations not geologically well endowed, as modern life cannot exist without them. Buyers will always seek out the sources where the cost is the lowest in the long term or where the supply is most secure, or both.

The energy minerals have been glamour commodities for world finance and are likely to remain so even if oil prices slip to $15 (U.S.) per barrel as many, including myself, predict. Even at $15, oil, and by extension coal, gas and other energy minerals, will yield quick and tangible returns to investors.

The other tradeable minerals will slowly pick up as world trade itself picks up. Existing producers will be the first to come back to the market, as their marginal production is the least costly. New producers will also be attracted when new, higher grade deposits are discovered as exploration once again gets underway. Major investments will be needed to make up for the long period of no investment, and even of disinvestment. As demand exceeds supply, prices will pick up and the rate of return on investments will slowly improve to the point where once again the international investment community will show interest. Great scepticism and caution are likely to moderate the interest until a really strong recovery is evident.

Non-tradeables

They are mainly the construction materials like sand, gravel, limestone and crushed rock. They are of interest only locally, and are hardly ever traded internationally. They are therefore unlikely to attract much attention from world financiers unless they happen to be part of other deals, or in the rare cases where they actually do move in world trade, such as, for example, cement and clinker.

Categories of Investment Targets

To complete the picture of mines and mining from the viewpoint of international finance, it is useful to also distinguish four sets of nations.

Developed or Industrialized Nations

Their economic activity will pick up first as the recovery begins. They have well organized financial institutions able to move finance easily and rapidly from any part of the world into mining and other ventures. The big four mining countries in this group are the USA, South Africa, Canada, and Australia - in that order.

Socialist Nations

They are also making determined efforts to improve their economies. Moves like those of Secretary Andropov to improve efficiencies and output, and of the Chinese to import modern technology, will have marked effects for the good. It remains an open question, however, to what extent these countries will seek international finance for their mines or for any other parts of their economies. The Soviet and Eastern European bloc countries are likely to remain outside the interest of international finance until their creditworthiness recovers. The Chinese may make big demands on international funds, especially if they go in for more massive mining ventures like the recently announced deal in which Occidental Petroleum will help them to develop the world's largest coal mine.

Oil-Rich Developing Nations

They are of little interest to mineral development, except for Mexico, and are now a source of grief to the international financial community, where once they were a major source of funds. Keeping the financial balls in the air and coping with the problems of the poorer oil-rich nations like Iran, Nigeria, Indonesia and Mexico are going to take a lot of the time and energy of international financiers, and they might let other priorities slide as a result.

Developing Nations

They represent probably the greatest potential for mining development because of their vast untapped resources in the ground, and their huge unsatisfied populations yearning for modern goods and a higher standard of living. The potential is likely to remain simply a potential for a long time to come. The economic and political mechanisms simply do not exist in these countries to allow rapid development of the resources and satisfaction of human needs. No clear path has emerged from nearly a half-century of intense activity in development to solve the endemic problems which beset these nations. Political rhetoric has replaced hard work as the means of getting to grips with the issues.

In the short and medium term, mineral development in the developing countries will attract international interest only when high-grade deposits close to shipping lanes offer a hope for low-cost producing of oil, gold, silver or the tradeable minerals. Even in those cases, politically-motivated bargaining and greed are likely to supersede any real desire to see the deposits explored. International interest will wane as political pressure and risks mount. That mountain of copper, Cerro Colorado in Panama, which some have called a mountain of money, still lies undeveloped fifteen years after discovery. Despite strong efforts by three major international groups to work out a deal with the government, everyone is more fascinated with how to get the most out of the eventual income for himself, than with the serious, difficult and risky work necessary to get the mine going.

One could summarize the interest in mining from the international financial point-of-view in a small chart:

Countries	Interest Level		
	Monetized Metals	Tradeable Minerals	Non-tradeable Minerals
Developed	Strong	Interested	Tiny amount
Socialist	Hardly at all	Hardly at all	Nothing
Oil rich	Barely existent	Practically non-existent	Nothing
Developing	Interested	Skittish	Nothing

Characteristics of International Finance

Who are these international financiers? It is not easy to describe them fully. Simply stated, international finance is the sum of all the individuals, corporations, pension funds, banks and other financial institutions who place funds outside their home countries. The pool of funds moving in these circles is immense. It is probably around $2 trillion (U.S.) at present, and past experience suggests that it is likely to grow rather than diminish, although growth will be extremely erratic.

Why are these vast sums of money floating around the world? There is really no mystery to that. Money goes into international finance because it does better there than it does at home. The various participants in international finance know that they will get better returns, better security, or better flexibility in placing their money abroad, than they would in keeping it at home where political uncertainty and little economic activity often mean a poor climate for investment. No one is in the international finance game for reasons of charity or goodwill. Even the official charity organizations like the World Bank stay in the game only as long as the perceived gains outweigh the perceived pains!

This does a lot to explain the apparent flightiness of international finance. It is the most liquid and fluid commodity in existence. With modern communications and modern networks of banks, brokers, and placers of funds, billions of dollars flow back and forth around the globe each day at electronic speed, seeking greater returns, greater security and greater flexibility, and preferably all three at once. International money does not care whether it is in mining, the treasury of a nation, buying cocaine, avoiding taxes, providing cash for a takeover bid, or merely resting for a while and collecting interest. It will be sent to where its owners or their advisers feel it will do them the most good, generally with little regard for the work it is performing.

Most of the funds are handled and placed through the remarkable mechanisms of what used to be called the Eurodollar market, which came into existence handling the then enormous sum of about $30 billion in U.S. dollars which was caught in Europe in the 1960s because it was no longer welcome at home. The mechanisms are now world wide and cope rather well with a pool of funds nearly a hundred times larger. Commercial banks and private placement firms are the most important institutions in the international markets.

The banks are now under immense pressure trying not to go bankrupt after a series of really foolish ventures when they were awash with petro-dollars which they practically gave away. The sight of major well-known banks competing in cut-throat competition with one another to lend vast sums to corrupt and incompetent African governments for ill-conceived purposes was commonplace in the 1970s. The private placement institutions are in better shape only because they were never awash with cash. They are also far more shrewd than the banks. They are very secretive, and typically seek out very good, very secure investments, which preferably are also very easily tradeable.

International finance will go into mining only when there is a chance to make a good quick return, with as little risk as possible. For this reason, international money for mining goes mostly into oil, coal, gold and silver ventures or into good oil and mining stocks traded on well-run and secure stock exchanges. Gold mines are the darling of the mining stocks.

Some of the bigger banks have tried to take a more long-term view of mining. The Bank of America developed special expertise in project finance for mines. Continental Illinois has a staff of thirty-five in its head office working on nothing but mining. On the other hand, very large banks like Chase and Citicorp have had only one or two mining engineers who had little more than an advisory role. As mineral prices dropped and mining ventures got further and further into difficulties, long-term bank involvement in them has decreased to almost nothing, apart from exceptional projects like the recently completed Quintette coal mine in British Columbia for which a large syndicate of top class banks provided nearly a billion Canadian dollars of financing.

It is unlikely that these trends will change soon. The banks have been burned in their international ventures and will be licking their wounds for a long time to come. The private placement institutions are more nervous than ever, and will demand ever higher returns and more flexible and more secure investments. International finance will simply not be strongly attracted to mining until mineral prices start to pick up.

Canada's Image in International Finance

Where does Canada stand in this cynical world of international finance? What hope does it have of attracting attention to its ailing mining industry? We need to digress a little to look at the Canadian mining industry from the point of view of the international financier.

What he sees mostly is an enigma. He sees Canada with the best of things when it comes to mineral potential, but with the worst of things when it comes to mineral development. Canada almost looks like a developing country.

On the plus side, he sees Canada having a superb geological endowment, the envy of the world. The rocks of the famous Canadian Shield are full of all types of minerals, and they have been swept clear by nature, making exploration easy and cheap. The Canadian mining industry is now well developed and large. After the USA, the USSR and South Africa, Canada produces more non-fuel minerals than anyone else. Production in 1981 was valued at 14 billion Canadian dollars. The industry is run by excellent people at all levels. Canadian miners are world renowned for their ingenuity, their conscientiousness, their pioneering and exploring spirit, and their persistence in times of adversity. They have left their mark on the industry in terms of outstanding technology, brilliant discoveries and ingenious ways of dealing with harsh conditions.

The international financier also sees that Canadian mining has strong support from other sectors in the economy. Facilities for processing the output of the mines are at hand to upgrade the crude ores. Exports of all crude minerals, including fuels, amounted to $14 billion in 1981, nearly matched by exports of fabricated minerals which amounted to $11 billion. Support in the form of well developed infrastructure is also available throughout the country, with ingenious methods of air transport and self-containment being used in the north. The international financier also sees that Canada is practically self-sufficient in its mineral needs. Apart from bauxite, phosphate, chromium, manganese, and tin, Canada needs nothing from abroad. It even has its own geological resources of all of these minerals but prefers to import them because of high costs of local production. In short, the Canadian mining industry has a lot going for it. Why then is it that international finance has such serious reservations about Canada?

Perhaps the biggest problem is that despite its huge size, mining is a small contributor to the overall Canadian economy. Including oil, mining accounts for only 10 percent of the GNP, while non-fuel minerals on their own account for only 4 percent. Non-fuel mining accounts for only 4 percent of all industrial assets, and contributes just under 5 percent of all taxes contributed by industry. Mining is simply not a major component of the Canadian economy. Even mineral exports, while large in themselves, provide only 18 percent of all Canadian exports.

Canada is also unfortunately one of the the world's highest-cost producers of most minerals. Canadian miners have to contend with low grades of ore in the ground, with long transportation distances, all the problems of carrying on difficult operations in remote areas, very high wages for workers and salaries for professionals, and with high taxation. Except for some relief on taxation, there is little that can be done to reduce the other inherently high costs. Technological advances continue to be made in an effort to reduce costs, and some of them are true breakthroughs. The huge continuous miners in Saskatchewan's potash belt, and the fly-in-fly-out techniques used for really remote areas are just two examples of outstanding technology which is helping to reduce costs, but is not conquering the problem entirely.

Compounding these problems even further is the highly fragmented structure of the industry. There are immense and continuous squabbles between management and labour, and between both of them and the developers of the new technology. The number of companies engaged competitively in mining is immense. There are nearly 250 major companies, those with assets over $10 million, let alone the literally thousands of minor companies, each trying to outdo the other. Canadian mining companies produce over 60 major commodities. There are Canadian companies which stay at home, those who venture abroad, those who move into the supply of mining goods and services, and some who are in all three activities. Each has its own axe to grind, and struggles to beat the other guy in fierce competition. The fragmentation is made even more difficult between individuals and companies. Even within companies, the distances between head offices in Toronto, Vancouver, and Calgary and operations out in the bush lead to fragmentation and lack of cooperation.

As if all this were not enough, the poor Canadian industry finds itself beset with the immense problem of a relatively unstable political environment which is largely out of its hands. The continual struggles on the national level between the federal and provincial governments, and between both of them and the Native peoples, are made worse by the extreme positions taken by the major political parties. The industry barely has time to adapt to the socialist policies of one party before an election comes up in which the socialists are thrown out, and right-wing groups take over, promptly reversing everything. Partly as a result, little has evolved in the way of a coherent and long-term national mineral policy that can be relied on. The fierce independence and doggedness that produce the best in the

Canadian miner also unfortunately produce the worst in acrimonious political debate which leaves him always confused and often quite dispirited.

In a similar vein, the international financier is left quite confused and often dispirited when it comes to placing funds in Canadian mining. Being the flighty character that he is, he therefore tends to leave things alone except for some special cases. Gold and silver are always attractive to international finance, and the good grades and high returns from many Canadian mines do bring in good amounts of foreign capital. Fuel minerals have also attracted foreign money, although it is now wary because of the moves towards nationalism. Special cases like coal for Japan and base metals for Europe have attracted long-term funds from the buyers. And in some cases, foreign mining money seeking a haven or a spread of risk has come into Canadian mining, as in the case of Anglo-American Corporation of South Africa taking over Hudson Bay Mining and Smelting Company.

On the other hand, international money being what it is, there are numerous Canadians who find it convenient to place a portion of their funds in the global money circuits, and much of that has gone into mining outside of Canada. On balance it may even turn out that the net flow of funds into Canadian mining is very small, if not negative. Canadians find three main areas of interest for mining investments abroad. Like everyone else, they go into the international darlings of oil, gold and silver ventures and stocks. They also need to go into foreign mining to supply themselves with those commodities they do not have at home or which are too costly to produce at home, and they put a lot of investment capital behind their exports of mining goods and services.

It is unlikely that Canadians will prevent this free flow of international money into and out of the country. It is also clear that nothing can be done to change negative aspects of Canadian mining like low ore grades, vast distances, remote locations, small contribution to the economy, and high labour costs. On the other hand, there is much that could be done in areas like lower taxation, uniform and long-term policies, better labour relations, and greater cooperation within the industry. The question arises, then, whether Canada is prepared to make a concerted effort to make itself more attractive to long-term financing, whether from abroad or from within its own borders. Before going into that, it is worthwhile to look a little more closely at the characteristics of mining finance to understand what differentiates it from general finance.

Some Pitfalls Special to the Mining Industry

All mining, whether it be for oil, gold, or more prosaic commodities like copper or gravel, has one thing in common: it takes a long time. Typically the finding, development and exploitation of a mineral deposit will take anywhere from 10 to 200 years. A median length of a mining operation may be around 25-30 years. In other words, mining is done best if it is allowed to proceed slowly and carefully so that the whole deposit is carefully and fully exploited. The company therefore must look for long-term and assured sources of finance, with large amounts needed at the start of an operation, but continuous injections needed thereafter to keep things going, especially through tough times when prices drop. One needs a 'generational view' when it comes to mining finance. It is here that the mine promoter bucks the normal business cycles. The typical business cycle in the modern economy is as short as 6 months and rarely longer than 3 years. While prices go up and down in these relatively short periods, the poor miner sees his cash flow go from boom to bust.

He is flooded with funds in the good times, and being human often uses the easy money unwisely. Then he finds himself strapped and barely able to keep the mine going in the bad times, when investment money may flow out of his operation. With many alternative investment opportunities and the usual high state of nervousness and worry of most money managers, the promoter finds himself whipped back and forth by the investors who pay no regard to the inherently difficult and dangerous task he has taken on. He gets little recognition of the long-term nature of mining. Nor does he get support during the bad-luck situations that arise when the ore peters out or the mine caves in because of unpredictable geology, which is no fault of his own.

There are two steps that the miner can take by himself to avoid these cyclical problems. In the first place, he can get himself into a large number of cycles, so that when the one cycle is down, the other will hopefully be up. In Canadian terms this means creating a very balanced mining operation with many commodities, and many locations. It may even mean moving into mining abroad and into the business of supplying mining goods and services. As Canada is well endowed with oil, coal, gold and silver, and as these commodities are likely to remain in good shape for the foreseeable future, a prudent Canadian mining company would certainly want to include some, if not all, of these commodities in its operations. A prudent Canadian company will also take advantage of the fact that minerals are widely distributed in Canada, and will have operations in many provinces. Hopefully, when the socialists are in power in one province, the conservatives will be in power in another, and it may even be possible to play one off against the other.

A second step that Canadian mining companies can take to beat the cycles is to retire debt from their balance sheets as fast as possible and keep it retired. The companies most able to withstand hard times are those which the professors of finance describe as having financial reserve and financial insurance. Having a basically strong balance sheet means that in hard times debt can be contracted with ease and without undue burden. That is financial reserve. If times get even tougher, even more debt can be contracted because of the high initial credit rating of the company. That is financial insurance.

The Canadian mining industry appears to have made a drastic mistake in the 1960s and 1970s when things were going well because of good prices. Flooded with funds, the mine owners turned away from increasing the equity in their companies, mostly so as not to lose control, and got seduced by the siren song of the higher short-term profits that can come from the leverage effect of taking on debt. At the very time they should have been strengthening their balance sheet, they weakened them, and they are now paying the consequences. In fairness, this phenomenon is not unique to Canadian mining companies. Practically everyone got involved in the game of paper money, levering up here to invest in paper money there. What someone calls 'paper entrepreneurialism' has been the vogue of most Western business for the past decade or more, and we are all suffering from that now. Even more suffering though is taking place in Canadian mining with its 50-percent unemployment and most of its great mines closed down. The cost of restarting alone is going to be high, and much of the blame must be laid on the unconscionable moves of many of the companies away from the basic business of mining and into the apparent glamour of high finance.

However blameworthy Canadian mining companies may be for getting too imbued with finance and not sticking to mining, they can hardly be blamed for the problems that have arisen because of the fragmented structure of the industry and the lack of coherent long-term policies. Here, the various governments must bear the responsibility, because it is they who are given the task by the people of providing the leadership which is a prerequisite to the process of constructing coherent societies and preparing sound, serious, long-term policies. It is here that the governments can and should do their part to shield Canadian mining from the ravages of the short-term cycles.

What is needed are the mechanisms to develop better understanding between owners, managers, investors, workers and, most of all, governments and the people at large, so that the inherent long-term nature of mining is explicitly recognized. Clear policies need to be formulated and put into practice so that the fortunes of today are shepherded and made available to cover the losses of tomorrow. No nation can afford to adopt a hit-and-run approach to mineral development. Policies also need to be formulated to break the impasse which now inhibits investors from taking the first difficult step to open a mine. Ore in the ground is worth nothing in reality. It must be mined to become valuable.

Comparative Perspectives

South Africa

It is instructive to look into a few cases where the long-term nature of mining has been explicitly recognized, and where mineral development has continued on a steady basis for decades - and nearly a century in one case - and where the development seems slated to continue indefinitely, as long as physical ore remains to be extracted. I will look first at gold mining in South Africa which will celebrate its first century of operation in 1986. I will then point out examples from Botswana and Australia where the long-term nature of mining has been given clear recognition through specific government policies, and through a determination by the miners to stay in business indefinitely.

South African gold mining is a socio-economic phenomenon with important historical and political messages, the full dimensions of which are only now being recognized. That it should be so robust and have such a healthy long-term outlook for the future seems to go against all conventional wisdom. What other extractive industry has endured for nearly one hundred years, has been the backbone of national development, and yet was the cause of a bitter civil war and still has to contend with chronic political uncertainty and the clear threat of massive upheaval? How is it that gold can be extracted from depths of two and a half miles below the surface where the rocks are almost too hot to touch and where the ore is extracted from a thin layer less than a yard wide? How is it that the industry can survive when the average ore for the whole industry contains less than one quarter of an ounce of gold per ton of rock, when most other gold mines must have at least a half ounce and preferably a full ounce or more per ton to make them economical?

How is it, too, that this industry, in what has become the pariah nation of the world has incredibly strong links to international finance, links that have persisted since it first began when 'South African Golds' were traded on the London market? Now its stock is traded worldwide, and much of its product is sold, accepted and imitated as a new international numeraire of wealth in the form of gold coins of exactly one fine ounce or fractions thereof.

Most of the answers to these questions can be found in the strong working relationships that have been forged between the mine owners, their managers, the workers, the investment community, and what is called in South Africa The State. Truly unique and well adapted institutions have evolved which by now are so cohesive that little short of global disaster will be able to break them apart. Unique methods of state participation and taxation, accounting systems, labor relations, and financing devices have come into being to create the robustness that allows the industry to continue despite all the odds against it.

The relationship between the state and the industry has all the marks of a good marriage. It is so intimate that there are no secrets. It is highly contentious, but disagreement is accepted as a matter of course, not as a cause of breakup. It is enduring, with both partners determined to make the relationship last forever, and it is harmonious as both parties share equally in the costs and benefits of keeping the industry going. The state holds all rights to precious minerals, but does no exploitation except for a small diamond operation. Rather, it leases its rights to private companies, which, for a consideration, use these rights to find and extract gold, silver, diamonds, and the platinum metals. Lease consideration and taxation levels are set low at the start so as to encourage the heavy investment needed to get things going, but both then can rise to nearly 80 percent of profits when windfalls are made in good times. On the other hand, in bad times the taxation and lease consideration levels drop to zero and even go negative, as state subsidies come in to carry an ailing company through difficulties which are no fault of its own making.

In the accounting and taxation formulae, little distinction is made between operating and capital costs. All capital expenditures are written off as they are incurred.

There are no depreciation or depletion allowances. Accounting therefore becomes quite simple and straightforward and is done virtually on a cash basis. Revenue from the sale of gold and by-products has deducted from it all costs which occurred in the accounting period, whether they were for ongoing operations or for capital expenditures. The cash remaining after deducting these costs from revenue is then subject to taxation, and the remainder, after deducting taxes, is available for distribution to the shareholders. The tax laws go even further. A so-called capital allowance is provided for, which allows a company which is unable to write off all capital expenditures in a particular accounting period to add compound interest to the unredeemed portion at rates between 6 and 10 percent. The idea is that the unredeemed capital would have earned at least that degree of interest if it had not been tied up in developing the mine. It therefore becomes very attractive to invest in mines in South Africa as all capital is repaid, with interest, before taxes are due. In other words, taxes are paid with what could be called after-investment profits. In this way, the inherent riskiness of investing in mining is given explicit recognition. Some mining companies even sell their tax advantages as a means of raising capital.

The financial institutions which have evolved to handle the needs of the South African gold mining industry are as unique as the state/industry relationship, the accounting systems, and the methods of labour relations. The Johannesburg Stock Exchange and the 6 so-called Mining Houses which cluster around it form an interlocking group of companies and financial clearing devices capable of handling the billions of dollars needed to keep the industry going.

The total revenue earned from gold mining in 1982 was just under U.S. $7 billion. Of this, $3.5 billion went to meet working costs, $1.5 billion went for taxation and lease considerations, and about $1 billion went to each of capital expenditures and dividends. After working costs have been paid for, the remaining cash is thus split roughly in thirds between the State, capital expenditure, and the shareholders - a relationship which has been holding for much of the recent history of the gold mines. Another way to look at this is to realize that after meeting working and capital costs, the revenue remaining is split about equally between the State and the private shareholders. Both have shown a tendency to reinvest a good portion of their 'take' back into the mines. The shareholders do this by buying gold mining shares on the stock exchange - not out of any motives of charity, but because gold mining shares are a good buy, and there are profits to be made. The State reinvests in the mining community in the form of infrastructure, education, and lately in a better deal for the black workers. In addition to reinvestment in gold mining, both State and private investors also invest heavily in what is called secondary industries, whose first task is to supply the mines with their requirements, but which by now are the backbone of the South African manufacturing powerhouse.

Each mine operates as a self-contained company responsible to its shareholders. Groups of mines are linked together by the Mining Houses which own controlling shareholdings in the individual mines. The Mining Houses are holding companies and provide common services like technical assistance and accounting. They also operate as financial institutions, taking dividends they earn from their shareholdings and using them for reinvestment in their own mines, in the mines of other mining houses, or in the shares of other mining houses. By now a complex set of interlocking shareholdings and directorships has formed to tie South African mining into a web that would give a U.S. antitrust lawyer nightmares.

It could indeed turn out that the South African gold mining experience is the result of unique and unrepeatable events that cannot be reproduced elsewhere, but that does not mean that it does not have lessons that can be learned, and, where appropriate, emulated.

Botswana

Botswana has successfully adopted the approach of designating important mining projects as of national importance. The Department of Mines (once largely staffed by seconded Canadians) has kept the disastrous Selebi-Phikwe copper-nickel mine going despite all odds, managed to renegotiate deals with Anglo-American Corporation to extract up to 60 percent of the profits of the Orapa diamond mine, secured Botswana a handsome position in the Jwaneng diamond mine at little cash cost, and is now negotiating terms for massive extraction of coal. Using a legal device known as a development approval order, the government is able to take such projects out of normal company legislation and tax regimes. The government makes special arrangements case-by-case on a flexible basis whereby the company and the government set terms for the amount of the government 'take' and then renegotiate them as often as needed. The system has worked well and enabled the new country to develop its remarkable mineral wealth rapidly, despite the changing fortunes of the individual mines, a very thin administration, and the threat of being overshadowed by South Africa.

Australia

Australia, too, has adopted an interesting variation of giving special attention to a particular mining sector. Sensing the relative difficulty of attracting and keeping investment capital in its low-grade, far-flung gold mines, the government has simply removed all income taxes from gold mining operations. Gold production has flourished as a result, as wealthy Australian individuals and companies shelter their income from taxes by going into gold mining. Australia realizes the importance of having access to the gold as a means of propping up its currency. Whether the gold is exported or not, it is money in the treasury, and strong support for paper money. The taxes foregone by exempting gold mining income from taxes are nothing compared with the gain made by getting the physical gold into the vaults in Canberra.

These then are some examples of what others are doing to promote their mining industries, and ensure that their miners have the support and assurance of continuity they need for embarking on their long-term and risky operations. From the super-sophisticated interlocking webs of South African gold mining to the simplicity of imposing no taxes on gold mining in Australia, we see how governments and miners are cooperating to produce valuable minerals as long as there is ore in the ground. Because of their determination, they are able to attract the finance needed for their operations, often from flighty international sources looking only for a profit.

Canadian Options

The question then arises how far Canada is prepared to go, to make similar arrangements to ensure the long-term viability of its mining industry, and to make it attractive once more for finance to flow in and stay? In some respects such binding and long-term arrangements seem to fly in the face of values like democracy, independence, and rugged individuality that are important to Canadians.

If I were a Canadian, I would feel strongly that something should be done to stick the pieces of the badly fragmented mining industry back together again. I would not feel that the discipline required to make the tough, binding, and long-term arrangements necessary to ensure the stability and continuity of a mining industry would be opposed to those other values so admired by Canadians. Rather, I would see the discipline as a framework within which full rein would be possible for the development of democratic, independent and ruggedly individualistic approaches to the thorny problems of developing mines. It would be a framework which would inspire the trust and dedication now needed to rescue the mining industry from its present dispirited state and turn it into the vigorous and robust generator of wealth that it can be. Once that vigour and vitality are seen to be present and alive, and once good, viable, long-term projects begin to emerge, there will be little or no problem in attracting the necessary finance whether from abroad or from home, and in persuading domestic money to stay at home and not seek better ventures elsewhere.

If Canada is to move towards such long-term, tough and binding arrangements, which model would it be advised to follow? The South African gold mining model has much to commend it, and many parts of it can be copied wholesale. However, it is too specialized, too tied to the South African milieu to be taken over completely. It is also unlikely that any part of Canadian mining will ever be as important to the national economy as gold is to South Africa. It would seem to me that Canada would do better by considering the Botswana approach of granting special status and privileges to selected projects, subsectors of the industry, or designated regions of the country. Unlike the Botswana model though, which tends to be a loose arrangement open to continuous renegotiation, and probably useful for a new country feeling its way, I would think that Canada could evolve clear, long-term rules for its special mining projects and sectors based on careful study of other successful special arrangements elsewhere. The rules would not be completely inflexible, but would be unlikely to be altered for mere changes in, say, price levels or labour agitation.

In looking into such arrangements, and bearing in mind the necessity to re-attract investment to the industry, Canada should ask itself if its mining taxation laws encourage or discourage investment. The introduction of simple changes emulating the Australians, by doing away with taxes altogether in a specific sector, might be one approach. Another might be to introduce taxation methods which explicitly recognize the need to allow invested capital to be returned to the investor before taxes are collected. Sliding scale taxation which captures windfall profits in good times but provides relief and even subsidies in bad times might also be considered. Taxation based on the rate of return on capital rather than on annual profits might be one device to be tested when special arrangements are considered. It would also be extremely useful, especially to the foreign investor, if there were uniform taxation systems applied to mining throughout the country, or at least in those sectors where special arrangements were being considered. The eternal battle between the federal and provincial governments for their relative pieces of the tax take could be resolved once and for all if special, long-term, uniform tax codes were set up for designated sectors of mining.

Government intervention through taxation is the ideal vehicle for it to see whether it should also intervene in other matters more of national concern than the health of an individual mine, such as mining to grade, prolonging the life of the mine as long as possible, ensuring sufficient infrastructure, and creating an attractive social and economic environment in which workers and managements will want to stay for the long haul. All such matters need to be looked into when questions of special long-term arrangements for mining are being considered as part of a revitalization program.

The question should also be asked whether these special arrangements should be made for all sectors of Canadian mining. In my view, the sectors that should clearly enjoy special privileges are those which supply the minerals vitally needed to ensure national self-sufficiency, those which are clear winners in the export market because of comparative advantages in the cost of production such as potash, western coal, and selected areas of oil and gas, and those which could be centres of development in remote regions. The sectors which should definitely not get any privileges are those which are high-cost producers by world standards and which will always be so. Unless there is some overwhelming social or political reason for keeping them going, they should rather be assisted to fade out and die. The in-between category of mines that are not vitally needed and which are not clear generators of national wealth could be allowed to compete in the national economy without privilege or special support.

These are strong prescriptions to lay before Canadian mining, but in my view they are vitally necessary if the industry is to be turned around and made attractive to international and local finance once again. It is presumptuous for an outsider to tell Canadians how to go about dealing with such radical questions. But it does seem to me that a propitious moment is now available and that a window is opening in the otherwise tortuous tangle of Canadian politics described above. The huge, nation-wide constituency of out-of-work miners is perhaps closer to the equally powerful constituency of out-of-luck owners and investors than it has ever been before. The picture is unlikely to change in the immediate future, as I see little chance for prices to rise quickly to the windfall levels which make everyone greedy and out to beat the other guy. Even oil and gas will be in a down cycle for some time to come. At the national level, it seems to me that the federal and provincial governments now have much more reason to get together than they have had recently. Both must now grapple with the unprecedented problem of how to get things going again, rather than the somewhat easier problem of how to split the loot.

So, how should Canada go about making those special arrangements needed to get its mining industry going again? To put it in one word, I would say: carefully. This is not something which can be rushed into lightly, but something that requires much careful study, both of the domestic scene, and of how others cope with similar problems. Frequent and open discussion is needed so that all points of view can be heard, and the results of good professional study aired and understood. It is also something which will not take place overnight. Longstanding problems require a long time to sort out. Great patience is needed. Even more, great drive and determination are necessary to identify and carry the bold ideas through inevitable clashes with the scepticism, criticism, and defeatism that are the norm of current political debate the world over.

The collection of views in this book, with contributions from the leaders of Canadian mining, and imbued with bold, intelligent ideas from a wide array of interested parties, could be a launching pad for getting a movement going to revitalize the industry.

CAPITAL MARKET FINANCING TECHNIQUES

Peter Gillin

Introduction

I will begin by outlining what the trends have been in mining finance both in recent times and over a longer period. I think it is useful to examine what has happened in the mining industry over the last ten years in order to better understand financing techniques and methods which are currently being utilized, and then possibly make some inferences about mining finance in the Canadian market in the future. My comments are divided into two categories. I will first review the financing record for mining companies in Canada over the last ten years with particular focus on the last five. Secondly, I will outline the financing structures which are currently being utilized by both the major mining companies and some more junior issuers. I will also describe some of the innovations in finance which the mining industry has used and, in my view, is likely to use increasingly in the future. My comments pertain predominantly to financing techniques available in the public capital markets in Canada, that is, to institutional and individual investors rather than banks.

Mining Finance Record

Table 1 outlines the average of selected balance sheet statistics of 48 Canadian mining companies. It can be seen that over the period 1973-81 there has been significant change in corporate balance sheets. The trend among these companies is clearly to the increasing use of debt in the capital of the companies. This has been particularly true in the five years ended 1981 when the average percentage of debt to total capitalization has risen from 13 percent to 19 percent. Although the data for 1982 are not yet available, it is likely that with the recent financial losses incurred by the industry, this trend continued into 1982.

Table 2 presents a more detailed analysis of certain financial statistics for Canada's 25 largest mining companies. It can be seen that the credit ratios of interest coverage deteriorated in the last five years. The schedule

Table 1

AVERAGE BALANCE SHEET STATISTICS FOR 48 CANADIAN MINING COMPANIES, 1973-81
(percent)

Year	Current Liabilities	Long-Term Debt	Other	Shareholders Equity	Total	Debt as % of Long-Term Equity
1973	13.9	10.4	2.0	73.7	100.0	12
1974	15.3	8.6	2.0	74.1	100.0	10
1975	14.0	8.3	2.1	75.6	100.0	10
1976	14.8	9.8	-	75.4	100.0	12
1977	15.9	11.0	-	73.1	100.0	13
1978	15.7	12.0	-	72.3	100.0	14
1979	18.5	11.1	-	70.4	100.0	14
1980	17.9	13.1	-	69.0	100.0	16
1981	16.1	15.2	2.0	66.7	100.0	19

Table 2

CANADIAN MINING COMPANIES SELECTED FINANCIAL STATISTICS

	Mining Companies	Canadian Rated Industrials		
		A	BBB	BB
Pre-Tax Coverage (after depreciation) (X)				
1981	2.63x	2.75x	1.58x	1.04x
1980	7.84	4.99	3.30	1.61
1979	8.26	5.63	3.70	2.03
1978	5.22	4.03	3.28	2.29
1977	4.09	3.22	3.12	2.36
Average	5.61	4.12	3.00	1.87
Fixed Charge Coverage (X)				
1981	1.84x	1.85x	1.10x	0.36x
1980	4.89	3.17	1.95	0.38
1979	4.94	3.42	2.19	0.65
1978	2.92	2.35	1.98	0.76
1977	2.19	1.80	1.73	0.70
Average	3.36	2.52	1.79	0.57
Cash Flow (Operations)/Long Term Debt (%)				
1981	28.34%	29.68%	12.04%	2.50%
1980	68.14	51.76	34.06	12.23
1979	77.59	54.80	33.31	15.36
1978	44.91	36.38	26.95	14.58
1977	37.87	28.88	22.28	15.04
Average	51.37	40.30	25.73	11.94
Long Term Debt/Total Capitalization (%)				
1981	29.60%	36.77%	47.21%	73.28%
1980	24.35	30.56	32.40	66.77
1979	22.98	31.70	33.09	67.78
1978	27.31	35.59	31.51	65.19
1977	28.14	38.52	36.89	66.53
Average	26.48	34.63	36.22	67.91
Long Term Debt/Common Equity (Market) (%)				
1981	46.38%	75.98%	162.41%	257.46%
1980	30.89	54.90	78.80	189.99
1979	30.54	68.93	91.27	232.12
1978	56.15	95.19	108.56	241.80
1977	54.45	109.17	106.60	299.98
Average	45.28	80.84	109.53	244.27
Pre-Tax Return on Assets (%)				
1981	8.73%	10.09%	7.30%	10.87%
1980	17.96	13.77	12.48	11.60
1979	18.83	15.61	11.76	12.28
1978	12.52	12.00	8.99	12.28
1977	9.95	9.89	8.53	12.06
Average	13.60	12.27	9.81	11.82
Pre-Tax Return on Total Capital (%)				
1981	10.32%	12.74%	9.41%	17.49%
1980	21.94	17.69	16.34	19.27
1979	23.18	20.28	15.57	18.30
1978	15.16	15.27	11.62	17.79
1977	12.17	12.54	10.98	17.30
Average	16.55	15.70	12.78	18.03

also sets forth the appropriate statistics for various credit quality levels of Canadian industrial companies. It is clear from this schedule that not only has there been a build-up in debt in recent years but there has also been a decline in the interest coverage statistics. Here again it is likely that the 1982 performance will be worse than 1981. It is notable that up to 1980 mining companies generally had more attractive ratios than industrial companies because, it appears, of their lesser use of leverage in contrast to their industrial counterparts. It is interesting also to note that while 'A' rated industrials, for example, have actually reduced their proportionate levels of debt in the last few years, the mining industry has increased its levels. This suggests that credit quality deterioration has been more rapid in the mining industry than in the higher quality companies in the manufacturing sector.

The traditional sources of financing in the mining industry have been internally generated funds (i.e. profits), the equity capital markets, to some extent the debt capital markets, and of course the banks. The appropriateness of these various sources depends on the particular circumstances of a particular company. Generally, however, it would be expected that companies would finance exploration projects out of cash flow or equity and development projects with debt and, if appropriate, debt with fixed costs. The capital markets do not always cooperate with the prudent plans of issuers. The rather unsettled behaviour of the Canadian capital markets in recent years has sometimes prevented issuers from financing in the most appropriate manner. This is generally true not only with respect to mining companies but with all issuers. Table 3 sets out the financing volumes for mining companies in Canada over the period 1973-82.

What is interesting to observe are the bulges in activity. For example, of the total common equity financing accomplished by mining companies since 1973, approximately 38 percent was raised in 1976 and 42 percent in 1982, with relatively small amounts in other years. Similarly, an analysis of the public debt financing arranged shows that 73 percent was raised in the 1974-77 period and 34 percent in 1977 alone. The absence of debt financing in the 1981-82 period reflects the difficult bond markets conditions which prevailed at that time. This general financing profile appears in all issues, not only mining companies. This illustrates that the market provides 'windows' for financing which can be separated by considerable periods of time.

Table 3

CLASSIFICATION OF MINING ISSUES IN THE CANADIAN PUBLIC MARKETS, 1973-82
($ thousand)

Year	Debt	Preferred Shares	Common Shares and Equity Units
1973	16,000	-	-
1974	172,900[a]	-	1,000
1975	300,000	150,000[c]	21,000
1976	165,000[b]	150,000	131,800
1977	546,600	250,000	5,900
1978	150,000	70,000	-
1979	146,000	-	5,000
1980	135,000	55,000	33,350
1981	-	185,000	7,100
1982	-	485,000	145,600
Total	1,631,500	1,345,000	350,750

Note: Only financing deals over $1 million are included in the aggregate totals. All U.S. dollar issues are converted into Canadian dollars at par.

[a] Includes $2,900,000 of debt convertible into common shares.

[b] Includes $5,000,000 of debt convertible into common shares.

[c] $150,000,000 of convertible preferred shares privately placed with CDC

Table 4 shows the averages of floating rate and fixed rate debt of 43 selected Canadian mineral industry companies in 1981 and 1975.

Table 4

FLOATING AND FIXED-RATE DEBT AS PERCENT OF CAPITALIZATION

	1981	1975
Floating rate debt	10.4	3.3
Fixed rate debt	10.4	9.5
Total	20.8	12.8

Consistent with the previous analysis, table 4 shows that debt as a percentage of total capital has increased significantly during the period. It is more significant that the floating rate debt percentage has tripled while the fixed portion has remained relatively flat. It appears that while public fixed rate bond financings were very difficult to arrange, mining companies were relying more heavily on bank financing. By the end of 1981 mining companies were considerably more exposed to floating interest rate risk than in the previous five years. The general level of interest rates was rising throughout this period with the prime rate peaking in the third quarter of 1981 at 22.75 percent. Moreover, a common sentiment during this period of rising interest rates was to wait until rates dropped to refinance the floating rate debt with fixed rate borrowings. With the recession taking hold in late 1981 and 1982 and profits declining, the cost of this floating rate exposure was great.

All these observations can be summarized as follows:

i the balance sheet strength of mining companies has deteriorated in recent years;
ii the full spectrum of Canadian capital market is not always available to all issuers;
iii much of the debt financing for mining companies in recent years has been floating rate.

Several obvious inferences can be made from these observations. First, the industry needs a significant volume of refinancing of debt to equity. In addition, much of the debt of mining companies should be refinanced from floating to fixed interest rates. Second, since unsettled market conditions appear to be the norm, mining companies should go to the public market when 'windows' are available, rather than waiting and anticipating better times. Finally, difficult markets require financing innovations in order for the industry to refinance and, more importantly, to finance the growth of natural resource development in Canada.

Techniques in Mining Finance

Historically the Canadian capital market has been receptive to conventional debt and equity financings of mining companies. As was noted above, a substantial volume of debt and equity offerings was achieved in the Canadian capital market between 1973 and 1982. For seasoned issuers and well known large companies, this receptivity depends on the established measures of investment quality. For common equity related securities, the earnings growth (past and future) and profitability record of the issuer are of key importance. For debt or preferred share securities, balance sheet strength and interest or dividend coverage protection are the principal measures. Even for the highest quality mining company issuers, it is important to remember that the market has 'windows' and that they should be utilized when they arise, both for debt and equity securities, because such windows can be separated by long periods of time.

It appears that the last quarter of 1982 and the first quarter of 1983 will prove to be a significant window for the stock market generally and the mining sector in particular. Several major mining companies have had issues of common shares in this period. It is clear that the market believes metals prices will rebound further and that the recession will be over soon. The consequence of this belief is that stock prices appear to have moved ahead of the price levels justified by the underlying economic fundamentals. Table 5 illustrates the levels of the Canadian stock market as measured by the TSE 300 Index and the mining sub-index. It can be seen that the market has moved up by 63 percent and the mining index by 72 percent from their respective 1982 lows. From their 1982 price lows, copper, lead, nickel and gold have increased 28 percent, 10 percent, 43 percent and 70 percent respectively. Naturally, there are many reasons why there should not be a linear relationship between stock prices and metals prices but the relative movements still appear to be out of line. There is clearly an optimistic tone in the stock market with respect to issues for Canadian mining companies.

Table 5

STOCK MARKET INDICES

	TSE 300		Mining Index	
	High	Low	High	Low
1983 to date	2,171.04	1,926.44	2,175.28	1,790.36
1982	1,958.08	1,332.22	2,337.97	1,264.30
1981	2,393.33	1,752.70	3,419.37	1,907.37
1980	2,405.65	1,752.70	3,815.27	2,149.39
1979	1,813.48	1,310.31	2,456.05	1,369.23
1978	1,336.34	996.80	1,491.01	960.27
1977	1,008.53	947.58	1,221.50	966.50

Several well known names have completed equity offerings in recent months including Inco, Falconbridge and Sherritt Gordon. I expect that this financing trend will continue as long as the market is sustained.

Conventional financing instruments will always be available to the mining industry in some form or other. I will review market conditions for various types of conventional instruments. The specific terms and indeed the feasibility of a particular financing for a particular issuer depend in large part on standard investment criteria and how the issuer's securities compare to other similar issues.

Debentures or Bonds

The Canadian bond market is quite credit-sensitive at the present time and therefore available only to the better quality issuers. Significant structural changes have occurred in the Canadian bond market since the dark days of 1980-81. We now have an upward-sloping yield curve which results in long-term interest rates being higher than short-term rates. This results in long-term debentures being more expensive than bank borrowings at the moment but, given the inverted yield curve history of 1980-81, the higher cost of fixed-rate financing can be looked upon as insurance. There is something to be said for fixing the cost of funds for mining projects for the life of such projects. The Canadian bond market is now far less term-sensitive than it has been in recent years. Lenders are now prepared to extend the term to 15 and sometimes 20 years for good quality issues. In contrast, there have been periods in the past when corporate bond issues of 10-year term were the longest available and were very difficult to sell.

Retractable Preferred Shares

This type of financing instrument is available only to issuers with good credit. Retractable preferred shares are viewed much like debt securities, and therefore the minimum investment quality standards of dividend and asset coverage must be achieved. Sometimes such issues contain a provision whereby the issuer may create a new series of preferred shares with a higher dividend rate into which the original series may be exchanged at maturity. Innovative variations have been introduced in recent issues including 'two pay' options which allow the holder to elect for dividends in Canadian or United States currency. Preferred share issues have also been offered with warrants attached to purchase common shares or additional issues of preferred shares. Such 'sweeteners' generally increase the size of the offering or reduce the dividend rate such financings achieve.

Conventional common equity instruments

As noted above, common share financings have occurred only periodically in the past. Many recent issues have been offered with warrants to purchase additional common shares and are a very popular feature of new issues of common equity these days. Convertible securities were more popular in the marketplace in 1982 than in 1983. Typically, after the stock market moves sharply upward, it becomes more difficult to sell convertible securities because the conversion premium tends to be perceived as expensive. If a stock price has just moved up by, say, 10 percent to 15 percent, then institutional purchasers in particular would rather participate in further upward movements by purchasing the common shares directly. These conventional financing techniques are generally available to the mining industry, subject to market conditions of course, in the same way they are available to any other industrial, utility or natural resource company.

There are also financing techniques which are unique to the natural resource industry, if to not the mining industry in particular. I will devote the remainder of my remarks to a discussion of commodity-backed securities and tax-oriented transactions.

Commodity-Backed Securities

Generally a commodity-backed security is one which is either indexed to, exchangeable for, or offered with warrants to purchase some specified volume of a commodity at a specified price. In relatively recent history, there have been several examples.

1. In 1980 the Sunshine Mining Company in the United States issued 'silver indexed' bonds. Appendix 1 sets forth the terms and conditions of this offering. In February 1983, Sunshine Mining did an almost identical financing, which is outlined in appendix 2.

   These transactions, when they were originally offered, reflected the fundamental advantages of such transactions. You will notice that the 'AAA' bond interest rates at the time of each financing were much higher than the interest rate offered on the bonds. If we assume the 'BBB' bond rate in February 1983 was 12.25 percent (assuming for the moment that Sunshine is a 'BBB') the bonds on a yield basis alone should be worth about 80.40 percent of their face amount. This implies the value of the silver index feature is 20 percent of the face value. Simply stated, the purchasers paid $200 to buy a call on 50 ounces of silver in 7 years (based on the average life) or $4.00 an ounce to purchase silver at $20 an ounce. It would appear that with respect to the 1983 financing the company obtained something in the order of a 4.25 percent interest rate saving on $30 million by giving up the price appreciation over $20 an ounce on 1.5 million ounces. The different trading levels of the two bonds appear to reflect that the issues provide for a deferral of the sinking fund to subsequent years at the option of the holder. The 1980 issue has had one sinking fund payment which, it appears, was deferred.

2. In January 1981 in Canada, Echo Bay Mines Ltd. completed an offering of preferred shares with warrants to purchase gold bullion. Appendix 3 sets forth the forth the terms of that financing and the current price levels of the component securities. Although the structure is

different from that of the Sunshine Mining financing, the transaction is conceptually similar. If we assume the normal dividend rate was in the order of 12 percent, then the value of the unit on a yield basis should have been $35.53. This means that the purchaser paid approximately $14.47 for a call on .0706 ounces of gold in 7 years at a premium of 8 percent over the market price. This amounts to about $205.95 per ounce. This issuer gave up the price appreciation over $595 U.S. an ounce on 120,000 ounces in exchange for 6 percent savings in dividend rate.

3. In February 1981, Refinement International N.V. completed a gold backed bond offering in the European market. The terms are set out in appendix 4. The interesting aspect of this transaction is that both principal and interest are payable in gold bullion. This transaction should theoretically represent the best inflation hedge since it can be payable in gold bullion. The interest rate should represent the 'real' required rate of return since it was offered at no premium to the then current price for gold.

4. In April 1981, Petro-Lewis International Finance N.V. completed an oil indexed bond offering in Europe, the terms of which are set out in appendix 5. This transaction was not particularly successful, largely because it was offered just about the time the market realized that there was an oil glut. The recent trading price is not reliable since the bonds do not trade actively. An interest rate saving was obtained by the company in this situation as well ('AAA' bond rates were approximately 12.9 percent at the time of the offering).

These types of financings seem to be most discussed and indeed most used in highly inflationary times, out of the belief by investors that precious metals in particular provide an ultimate inflation hedge. For a period at least, this belief was extended to oil, presumably in the belief that the energy shortage would result in ever-increasing real prices. Commodity-backed securities may also have a place in the market to provide direct market plays in cyclical commodities. Such securities could avoid the inherent risks of dealing in the raw commodity or futures market and at the same time provide some kind of cash or cash equivalent return. There has been talk of various other kinds of commodity-backed securities including those indexed to, or with warrants to purchase, such minerals as copper, silver, nickel or a 'basket' of commodities. The latter 'commodity cocktail' could be structured to suit the particular issuer's relative production volumes of the different metals.

The early concepts of commodity-backed securities contemplated providing an inflation hedge and thus precious metal backing was considered important. I think this is still true. When non-precious metal prices are at relatively low levels, where there is still some upward movement expected, I think a 'commodity cocktail' including some non-precious metal components would get a reasonable market reception. Financings of this type require some degree of glamour which may not likely be provided by warrants for copper or nickel alone. It is generally the sophisticated investor who understands the cyclical behaviour of prices for such commodities, and is prepared to invest according to his view of where we are in the cycle.

Institutional investors tend to take this view, and indeed they are providing the principal thrust to the recent mining stock price boom. It is unlikely that investors purchasing 'commodity cocktail' securities would ever really intend to take delivery of the commodity. On the other hand, the precious metal-indexed security purchaser always believes he can get the gold or silver if he wants it, and he thinks he will want it if his traditional economic assets fail. Such is the psychology and glamour of precious metals.

What does the issuer get for selling a fixed-price call on his gross revenues? Make no mistake about these types of securities: they are a call on revenues rather than profits. The principal advantages are that such a contribution to security enables the company to achieve a significantly lower nominal cost of funds than would be the case without such a feature. It also enables the issuer to achieve a significantly larger transaction than he could without such a feature. Finally, the issuer could be selling his commodities at a premium over the prevailing price at issue. The issuer of course is betting that the price rise in the commodity by the time he delivers will be less than the price rise anticipated by the purchaser. To the extent the issuer is correct, his real cost of financing is low; and to the extent he is wrong, it is expensive.

The only structure that has been used publicly in Canada for these types of securities has been units consisting of preferred shares and prepaid warrants to purchase the commodity. One of the attractive features of the current structure is the ability to strip and trade the warrant as a separate security.

The relative proportion of bond versus commodity options is determined by, among other things, the overall unit yield and the premium upon exercise of the commodity warrants. Generally speaking, the higher the unit yield provided, the higher the exercise premium can be. Appendix 6 sets forth the pricing pattern for a good quality debenture offering with warrants to purchase gold bullion. In this analysis the two components are valued and added together. Clearly, the higher the exercise premium becomes, the less valuable the warrant component becomes, all things being equal. As a result, the bond value component of the unit rises such that the average 'unit' yield rises. Conceptually, it is easier to think about these instruments as low coupon bonds with warrants to purchase gold bullion, much the same as the Sunshine Mining bonds.

For tax reasons related to both the issuer and the purchaser (as well as, in the case of gold, the Gold Clauses Act of Canada, which prohibits debts payable in, or indexed to, gold bullion), these securities cannot be structured as straight bonds with free rights to the commodity. The concept is, however, that the purchaser receives a bond which matures at $1,000 but has a low interest rate (and therefore should trade secondarily at a substantial discount to its par value when stripped of its commodity attributable) and a feature to purchase the commodity for a specified term at a specified price. There are other terms which may be altered which affect the value of the commodity option. It is generally understood that the market accords very little value to warrant terms of much longer than the 5 years, although theoretical values for 7, 8 and 10 year term warrants can be very high. This would suggest that an issuer consider only a 5-year option, or a step-up in exercise price after 5 years. The issuer strives to minimize his unit cost of funds while maximizing the exercise premium over the prevailing market price of the commodity.

Commodity-backed securities are ideally suited to mining companies producing the particular commodity. It is theoretically possible for any company to issue commodity-backed securities if it has the financial strength to honour a commitment for a commodity it does not produce. However, it would likely be very difficult to sell such an issue. The fundamental protection the investor has is that the issuer actually produces the gold, silver, oil, copper or whatever. Consequently, the attributes, security and covenant pattern for such issues are related to reserve lives and production levels. The ultimate risk to the issuer is that he cannot produce at a profit the commodity to be delivered under the warrant. As I noted above, unlike a common share warrant which is notionally a call on the profits of the company, a commodity warrant is a call on the revenues of the company irrespective of the costs incurred to achieve the revenues.

Commodity warrants do not need to be related to natural resources only; the principle can be expanded into any warrant for anything. Some of the wilder variations I have heard of involved preferred shares of an airline with a warrant to purchase tickets, or debentures of a ski resort with season tow tickets attached. I don't think the Canadian capital market is quite ready for these variations.

It is very difficult to assess the appetite for such securities in the Canadian market at the present time, because the demand for such a transaction depends, to a significant extent, on the quality of the issuer. Although investors do not apply the same rigour to the credit analysis of a commodity-backed security, they ultimately depend on the issuer to deliver the commodity. I believe that, given issuers of reasonable credit quality, the Canadian market would have a substantial appetite for precious metal warrant transactions.

Tax-Oriented Transactions

The other technique which is appropriate to the natural resource industry is tax-oriented financings.

The oil and gas industry, up until 1980 or thereabouts, enjoyed an unprecedented boom in activity and financing. A significant portion of the funding was achieved by way of tax-oriented financings such as the so-called 'drilling funds'. One of the fundamental reasons such a volume of financing was raised in this fashion was that the industry had enjoyed a period of success in exploration in western Canada and there was little doubt at the time that oil and gas reserves discovered could be eventually sold at attractive prices. The only real risk the investor was taking was with the success of the exploration activity. Since that time, a couple of things have happened: exploration activity has declined due to the NEP; the total demand for oil and gas has declined; there is some question now as to whether prices are to rise forever in Canada.

The mining industry has many tax incentives similar to those available to the oil business (except, of course, those related to the NEP). These could be exploited to a greater extent than they have been in the past. A very significant difference in the mining industry, however, is that there is not the same ultimate assured demand or price level maintenance for the resources that the oil and gas industry enjoys. Tax-oriented transactions therefore have not been used all that widely in the mining industry, but I believe this may be changing. There are two principal structures for tax-oriented financing: 'flow through' shares, and limited partnerships.

'Flow through' shares have been used mostly in the past by oil and gas companies and a few mining companies to raise equity capital. 'Flow through' shares are shares (either preferred or common) of a company which are 'earned' by investors as consideration for making certain expenditures on natural resource exploration and development. These expenditures give rise to tax deductions for Canadian exploration expense ('CEE'), Canadian development expense ('CDE') and Canadian oil and gas property expense ('COGPE') by the investor, thus reducing his cost. In the 1981 federal Budget, certain amendments were proposed which resulted in 'flow through' shares being more attractive than before; in my view, the likely result will be increased utilization by mining and oil and gas companies. The principal tax amendment was the change in treatment on disposition of such shares to a capital gains basis (if the taxpayer normally claims such) rather than an income basis. This allows for what I call a 'tax arbitrage', which results in such shares being very attractive to both the issuer and the purchaser at the expense of the tax collector. Table 6 sets forth an example of the pricing of a flow through common or preferred share.

The common share analysis assumes that flow through shares are issued by an existing public company to fund its exploration and development activities. The advantage of doing so is apparent insofar as the company is able to issue shares at a premium over the prevailing market price. The extent of the premium is dependent on the perceived value of the tax benefits and, as you can see, the maximum 'premium' is 50 percent if the expenditures are Canadian exploration expense (100 percent write-off) for tax purposes. This analysis assumes that the common shareholder would look to a rise in the common share price to provide him with his return. As a practical matter, the units would be offered at some price less than his. Since the tax benefits are worth less if the expenditures are to be Canadian development expense, the unit price would be lower. The analysis of preferred shares is also presented and it can be seen that the principal advantage lies in the lower nominal

Table 6

'FLOW THROUGH' SHARE ANALYSIS FROM PURCHASER'S VIEWPOINT

Shares	Common Shares	Preferred
Stock price at offering	$20	$20 par value
Unit offering price	$30	$20
Premium	50%	nil
Tax deduction at 100% assuming full CEE in 1 year	$30	$20
Tax saving at 50%	$15	$10
After-tax cost	$15	$10
Proceeds on disposition of shares	$20[a]	$20[b]
Taxable capital gain	$10	$10
Taxes at 50%	$5	$5
Net proceeds	$15	$15
Rate of Return	nil	7.00%[c]
Dividend	nil	4.00%
Total Return	nil	11.00%

[a] Assumes stock price does not change.

[b] Assumes 5-year retractable preferred.

[c] Compound after-tax return upon retraction.

dividend rate which can be obtained (4 percent). There have been additional tax amendments proposed which require that such flow through retractable preferred shares have a term of at least 5 years. The changes in the tax treatment originally proposed in the November 1981 Budget offer, in my view, significant incentive to the mining industry to finance in this way.

From the company viewpoint, however, a careful analysis must be made of its current and prospective tax position in order to determine the attractiveness of flow through shares or any tax-oriented financing. Clearly, if the issuing company is currently not paying taxes and therefore cannot otherwise use its own tax deductions, it would be wise to examine the merits of 'flow through' shares. Of course, the longer the issuer expects that it would not be paying current tax, the more economically attractive the issuance of these shares becomes. Table 7 sets forth an analysis of the economic cost of 'flow through' shares depending on when the issuer becomes taxable. The maximum premium required is that which compensates the company for foregoing its tax benefits and, of course, the longer it expects not to be taxable, the less of a premium is required. The common share analysis assumes that, if the issuer were to spend the proceeds of issuing one $20 share on CEE, the value of the lost tax benefit should be compensated for in the issue price of the new shares since, if it issued non-'flow through' shares for $20, the company would keep the benefits for all the shareholders. The analysis illustrates that, if the shares were sold to the purchasers outlined in table 6 for $30, the company would be fully compensated for its loss of tax benefits. The preferred share analysis assumes that an additional cost of the preferreds would be the loss of tax deductions to be taken in the respective years. Here again, the longer the company is non-tax-paying, the better off it is. The exact situation of the issuer, of course, will depend on its particular circumstances. An issuer must have a significant exploration and/or development program for this approach to be appropriate.

A recent precedent for this type of transaction was set by Canamax Resources Inc., the Canadian exploration operation of Amax Inc. A preliminary prospectus was filed on January 28, 1983, and the transaction was offered in March 1983. It consisted of $6 common shares and units to earn 'flow through' common shares during 1983 and 1984. The Canamax transaction is interesting to the extent that it is totally exploratory: that is to say, it has mainly speculative appeal since there are no producing assets in the company.

Numac Oil and Gas Limited successfully completed a 'flow through' common share offering in January 1982 which fully funded the company's exploration, development and land acquisition program for 1982. At the time the units were offered, the common shares were trading at $22 per share and the units were offered at an effective price of

Table 7

ANALYSIS OF ISSUANCE OF FLOW THROUGH SHARES
($, unless otherwise indicated)

	Issuer becomes tax paying in year								
	1	2	3	4	5	6	7	8	9
Common Shares:									
Common share proceeds (assuming $20/share issue price)	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
PV (15%) of CEE tax benefits at 50%	8.70	7.56	6.58	5.72	4.97	4.32	3.76	3.27	2.84
Total per share value	28.70	27.56	26.58	25.72	24.92	24.32	23.76	23.27	22.84
Maximum required premium	44%	38%	33%	29%	25%	22%	19%	10%	14%
Retractable Preferred Shares:									
$20 par $20 par value and 6-year retractable 4% dividend rate									
Cost of funds:	15.04%	13.42%	12.28%	11.41%	10.72%	10.15%	9.68%	9.27%	[illegible]

$26.50 per share representing a 20 percent premium over the prevailing market price. This offer was notable insofar as it involves the common shares of the company which had value regardless of the success of the 1982 program.

An alternative tax-oriented structure which has been used in the mining industry recently and the oil and gas industry for some time is the limited partnership. This structure typically involves the creation of a limited partnership which is managed by a natural resource company as general partner. Ths general partner then directs the expenditures of the proceeds of the sale of limited partnership units to drilling oil wells or to searching for mineral reserves. The tax deductions for CEE and CDE flow to the limited partners, and the partnership earns a substantial direct percentage interest in the properties. If the venture is successful, partners receive their proportion of future cash flows from production. Lately the volume of this type of financing has diminished in the oil and gas industry, because of both a decline in activity and, in the case of some funds, mixed success.

In the mining industry the limited partnership structure was applied to an offering by La Société en Commandité Aiguebelle 1982 in November 1982. In this transaction, the limited partners made expenditures on the sponsor's principal gold mining properties and received gold bullion from first production rather than a significant percentage interest in the mine. This structure was appealing to the issuers since it retained a full interest in the property after the delivery to the limited partners, and it was property-specific. Because it was property-specific, if the particular property never came into production the sponsor's obligation was extinguished. This feature is of particular significance since, in the case of 'flow through' common shares, the issuer gives up a permanent interest in the entire company, and in the case of 'flow through' retractable preferred shares, the issuer must pay back the issue. In either case there is an obligation on the part of the company irrespective of the success of the program. The Aiguebelle transaction was also facilitated by the availability of an additional 66.6 percent write-off to Quebec taxpayers on their Quebec income. For a taxpayer in the 50-percent bracket, for example, after-tax cost was in the order of 17¢ on the dollar. This incentive resulted in the commitment of $1 of gold at then current prices for each $1 raised by the issue.

The economics of such funds in other jurisdictions are such that, in order to provide similar rates of return to the purchasers, up to $1.60 in gold must be committed for every $1 raised in this manner. These Quebec rules are extremely attractive and should provide a model for the federal tax authorities. Incorporated in the federal rules, they would be a major incentive for the future development of Canada's mineral resources. I believe futhermore that the volume of funds that could be raised by this type of financing would be greatly increased by such an incentive, particularly for development activities.

I should point out that the Aiguebelle transaction was greatly facilitated by the precious metal aspect. The development of a copper or zinc or other mineral prospect might also be financed in this way, but it would probably be more difficult, particularly in the absence of greater tax incentives than exist at the moment, and because precious metals have a glamour in today's market which other metals lack. Issuers should not be in need of the tax deductions; otherwise, it would be worthwhile for them to fund the expenditures themselves. The precise terms for such deals can be negotiated, and depend on tax timing and the attributes of the property prospects, as well as the quality of the sponsorship.

One final variation of this theme could be 'flow through' preferred shares with commodity warrants, which would have the effect of reducing the cash carrying cost of the preferred share structure. This may be an interesting and attractive technique for financing. There comes a point in any financing structure, however, where simplicity is worth a great deal. Any transaction involving tax features or commodity warrants is likely to be complex, and complexity can be expensive.

Appendix 1

SUNSHINE MINING COMPANY
(U.S. $25,000,000 Silver Index Bonds)

Summary of Terms and Conditions

Date:	April 10, 1980
Coupon:	8.5% per annum, payable semi-annually
Market:	United States
Par Value:	$1,000
Issue Price:	100% to yield 8.5%
Silver Interest:	Principal payment at maturity is the greater of par value or the market price of 50 ounces of silver. At the time of offering, the market price of 50 ounces of silver was $800. The silver indexing reflected a 'premium' of 25%.
Term:	15 years
Redemption Privilege:	Redeemable by the Company if the indexed principal amount equals or exceeds $2,000 for 30 consecutive days.
Sinking Fund:	7% per annum
Estimated Average Life:	7 years
Listing:	New York Stock Exchange.
Yield for 'AAA':	At the time of offering, the yield to maturity for 'AAA' credit, 15 year debentures was 11.83%.
Current Price of Silver:	U.S. $10.49
Current Price of Bond:	$110 to yield 7.24%
Current 'Premium':	91%

Appendix 2

SUNSHINE MINING COMPANY
(U.S. $30,000,000 Silver Index Bonds)

Summary of Terms and Conditions

Date:	February 11, 1983
Coupon:	8% per annum, payable semi-annually
Market:	United States
Par Value:	$1,000
Issue Price:	97.50 to yield 8.33%
Silver Interest:	Principal payment at maturity is the greater of par value or the market price of 50 ounces of silver. At the time of offering, the market price of 50 ounces of silver was $706.25. The silver indexing reflected a 'premium' of 42%.
Term:	12 years
Redemption Privilege:	Redeemable by the Company if the indexed principal amount equals or exceeds $2,000 for 30 consecutive days.
Sinking Fund:	10% per annum
Estimated Average Life:	7.0 years
Listing:	New York Stock Exchange.
Yield for 'AAA':	At the time of offering, the yield to maturity for 'AAA' credit, 15 year debentures was 10.75%.
Current Price of Silver:	U.S. $10.49
Current Price of Bond:	$98 to yield 8.27%
Current 'Premium':	91%

Appendix 3

ECHO BAY MINES LIMITED
($85,000,000 Preferred Shares and Gold Purchase Warrants)

Summary of Terms and Conditions

Date:	January 27, 1981
Unit Consisting of Preferred Share:	$25
Warrant Prepayment:	$25 (4 warrants at $6.25 each)
Preferred Dividend:	12%
Issue Price:	$50 to yield 6%
Redemption:	Manatory redemption of 20% per year commencing in 5th year.
Warrant Team:	Commencing in 5th year one warrant per year for four years. Purchase price of warrants are refundable if not exercised.
Warrant Exercise Price:	1 warrant entitles holder to purchase .01765 ounces of gold at $595 U.S. per ounce. The price reflected a premium of 8% over the then current market price.
Estimated Average Life:	7.5 years
Current Price for Gold:	$435/oz US
Current Price:	
Preferred Shares:	$23.25
Four Warrants:	$22.38
Total:	$45.63
Current Unit Yield:	6.57%

Appendix 4

REFINEMET INTERNATIONAL N.V.
(U.S. $51,950,000, 3.25% Gold Indexed Bonds Due February 1, 1996)

Summary of Terms and Conditions

Date:	February 10, 1981
Coupon:	3.25% per annum, payable annually, based on the market price of 10 ounces of gold bullion.
Market:	Europe
Principal Amount:	10 ounces of gold bullion
Offering Price:	$5,195 per bond, equal to the then current London brokers' afternoon fixing price.
Interest Calculation:	Based on the average market price of gold for the 10 trading days ending on the fifth business day prior to the interest payment date.
Redemption Privilege:	Bonds are also redeemable at the option of the company any time on or after February 1, 1986. The bonds are also redeemable in the event the market price of 10 ounces of gold exceeds $2,000 over a 60 consecutive day trading period or in the event of certain changes involving United States or Netherlands Antilles taxes.
Guarantee:	The bonds are joint and severally guaranteed by Refinemet International Company and R.M.I. Refinery, Inc. (owned by Refinemet International).

Security Interest:	The guarantees will be fully secured primarily by certificates obligating corporate users and refiners to deliver gold and, to a lesser extent, warehouse receipts and bills of lading covering gold bearing materials, futures contracts, letters of credit and gold bullion.
Current Price of Gold:	$435 U.S.

Appendix 5

PETRO-LEWIS INTERNATIONAL FINANCE N.V.

(U.S. $20,000,000, 9% Guaranteed Oil-Indexed Notes due 1986)

Summary of Terms and Conditions

Date:	April 23, 1981
Coupon:	9% per annum, payable annually
Market:	Europe
Par Value:	$1,000
Issue Price:	$1,000 to yield 9%.
Contingent Price:	Holders of Notes will be entitled to receive Contingent Interest, at maturity, based on 18.5 times an increase in the Crude Oil Price in excess of U.S. $36.16, subject to a maximum Crude Oil Price of U.S. $68.00. The Crude Oil Price is based on a 3 month average of spot oil prices for 7 designated non-U.S. oils, for the period ending February 28, 1986 or any calendar quarter for any quarter ending December 31, 1985.
Term:	5 years
Retraction Privalege:	Holders of Notes are entitled to redeem the Notes on November 1, 1983 at $1,182 for each 1,000 of principal, providing a yield to maturity from issue of 14%.
Current Price of Oil:	$30.00 - $34.00.
Current Price on Notes:	107 to yield 6.40%.

Appendix 6

EXAMPLE OF PRICING FOR BOND WITH GOLD PURCHASE WARRANT

	$1000 Units:					
Exer. Prem.[a]	Bond'A' Credit	Gold Purchase Warrant Prepayment	Bond Term	Warrant Term	Unit Yield	Ounces per $1000
10%	$381	$619	10 yrs	10 yrs	4.6%	1.65
15%	$420	$580	10 yrs	10 yrs	5.0%	1.58
20%	$458	$542	10 yrs	10 yrs	5.5%	1.51
25%	$490	$510	10 yrs	10 yrs	5.9%	1.48
35%	$545	$455	10 yrs	10 yrs	6.5%	1.35
82%	$724	$276	10 yrs	10 yrs	8.7%	1.00

[a] Exercise Premium.

IMPACT OF INFLATION ON MINE FINANCING[1]

Basil Kalymon

Introduction

The past decade has seen the phenomenon of high levels of inflation reaching double digit levels which are unprecedented in the post-war period. While current trends are toward some abatement, we are still living with embedded expectations of inflation well above those of the 1950s and 1960s. With this current recession, the immediate prospects appear to be for lower inflation rates while, at the same time, the massive levels of government deficits in both the USA and Canada create the spectre of a possible future rekindling of inflationary pressures. Such an inflationary environment creates a major impediment to the financing of capital intensive projects in general, and to mine development more specifically.

This paper discusses the nature of the impact of inflation on mine financing. The problem has become increasingly recognized as a structural failure of our financial markets and institutions. Just as with our accounting systems, the basic premise of the lending markets is the assumption of a stable, non-inflationary currency. While such an assumption is tolerable under low inflation levels, it grows increasingly inappropriate and cumbersome with double digit inflation.

The basic issues which give rise to problems in financing in an inflationary climate will be discussed under several headings. The first is the effect of inflation on the costs of capital and the behaviour of interest rates, and on required investor returns on equity capital. Next, the structure of economic returns from capital investment projects are considered.

Subsequently, an illustration of these effects on a potential mining venture will be given. The illustration is based on an actual situation which has been re-scaled and simplified for demonstration purposes. While each mining project has its own unique characteristics, the directional impact on the evaluation of a project for financing will be quite similar.

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[1] A version of this paper was presented to the 85th annual general meeting of the Canadian Institute of Mining and Metallurgy in Winnipeg on April 19, 1983, subsequent to the CRS Mine Finance Seminar.

In the final section of this paper, I discuss the possible remedies which would be required in the financial markets to overcome the distortions created by inflation. These remedies can be seen as either ad hoc procedural adjustments or more fundamental changes in the nature of financial instruments. While financing is only one aspect of a mine development project, proper recognition of the artificial impediments created by inflation is necessary if the development is not to be hindered or stopped altogether.

Effects of Inflation on the Cost of Capital

I turn now to the question of the effect of inflation on the cost of capital. This effect is the basis of the distortions which are created in the analysis of the debt capacity and viability of a new project.

Fisher's Law

The key relationship which pertains is the so-called Fisher's Law of economic theory. This law essentially enunciates the principle that interest rates will reflect the prevailing rates of inflation. Since lenders will demand compensation for inflation, the interest rate will be a combination of the inflation rate plus a real return on capital. This relationship can be expressed as shown in table 1.

Table 1

EXAMPLE OF THE RELATIONSHIP OF INTEREST RATES AND INFLATION
(in percent)

Rate of Inflation	Real Interest Rate	Nominal Interest Rate
0	5	5
5	5	10.25
10	5	15.50

Where: G = rate of inflation
R = nominal interest rate
r = real interest rate

$1 + R = (1 + G)(1 + r)$, or
$R = G + r(1+G)$

The obvious observation concerning the effects of inflation is that interest rates will be higher. (In making this statement, the well known role of the government in modifying interest rate levels through monetary and fiscal policies is not being denied, but simply being placed in a long-run context). However, due to the existence of inflation, the higher interest rate is not necessarily an indication of a real increase in the cost of capital. As we can see from the example in table 1, the real return was held constant but the nominal rate of interest increased.

The most striking aspect of the increased rates of interest under inflation is that the interest payment rises totally out of proportion with the rise of general prices as measured by inflation indicators. Thus, for example, when prices move from a stable environment to an upward rise of 5 percent, we see the interest rates in the market moving from 5 percent to a level of 10.25 percent. This move represents an interest payment which has more than doubled! At the higher 10 percent rate of inflation, the interest payment would have more than tripled as compared to the stable price environment.

Capital Repayment

The key to understanding this distortion is recognition of the nature of the components of the interest payment under inflationary conditions. The major portion of the interest rate represents a repayment of capital if viewed from the perspective of real economic position.

This effect is illustrated in table 2, for a simple loan with a fixed repayment schedule. Here, we can clearly see that the loan balance is, in real terms, decreasing much faster than the nominal balance. The faster decrease in the real loan balance outstanding can be directly attributed to the component of the interest payment which pertains to compensation for inflation. In real terms, the lender is requiring compensation for the faster decrease in the loan balance through the interest payment. The effective repayment in the example loan is substantially higher than the nominally indicated amount of the principal payment.

Table 2

OUTSTANDING LOAN BALANCE UNDER INFLATION
(dollars)

Year	Nominal Loan Balance	Interest Payment	Implicit Repayment In Interest	Principal Payment	Real Loan Balance
1	1,000	155.0	100	100	900
2	900	139.5	90	100	810
3	800	124.5	80	100	648
4	700	108.5	70	100	510
5	600	93.0	60	100	394
6	500	77.5	50	100	295
7	400	62.0	40	100	213
8	300	46.5	30	100	143
9	200	31.0	20	100	86
10	100	15.5	10	100	39

Assumptions: Inflation rate 10%
Real interest rate 5%
Nominal interest rate 15.5%

We further notice that the extent of the increase in total effective repayment is exaggerated in the initial years. Thus, in year 1, we see the effective repayment of capital at a combined level of $200, as compared to the year 10 total of $110. Even more dramatic is the real payment which, between years 1 and 2, has the outstanding real balance fall by $180 while, between years 9 and 10, we see a drop of only $47.

This shortening of the effective duration of a conventional loan and the resulting shift in the repayments to the early years is referred to as 'front-end loading'. This loading of the costs of debt financing into the early years of operations can obviously create unacceptable financial pressure or, in fact, make the project impossible to finance.

In contrast to debt financing, equity capital does not impose any fixed schedules for the payment of returns. This flexibility does not, of course, imply that the rate of return on equity capital does not also increase under inflationary conditions. In fact, the required returns on equity must follow a pattern similar to that illustrated in table 1 for interest rates. Any other assumption would suggest that equity investors do not require the same compensation for capital erosion demanded by debt holders. In addition, the general levels of real returns expected by the equity holder are higher, reflecting the higher risks which he is required to bear.

The demand placed on the equity capital under inflation can be seen only by considering the timing of the returns from capital investment projects, a topic to which we now turn.

Delays on Returns to Capital Intensive Projects

The essential property of an inflationary environment is that prices, in general, are expected to increase. If this is assumed to be true for the price of the output, then the gross revenues from a project would be expected to rise, even if output volume is held constant. More importantly, if the operating costs increase at the same rate, then the operating profits from a venture would also rise at the given inflation rate.

Timing of Returns

For a simple project, this in effect is demonstrated in table 3. The main effect which is relevant is the timing of the returns to total capital. While inflation increases the nominal operating profits, the effect is gradual. Compared to the revenue stream in an inflation-free environment, the initial year's operating profits are identical. By the second year, the operating profits under inflation have increased only by 10 percent, the rate of inflation. By the tenth year, however, we see that the operating results are more than double those resulting from a stable environment.

Such results show that the rates of returns from capital intensive projects can be expected to be relatively low in initial years, but will be high toward the later years. For attractive projects, the returns in later years must compensate for inadequate returns in the initial years. Thus, we see in table 3 that the project shows an initial rate of return on invested capital of only 5 percent. However, the rate of return is growing at an annual rate equal to inflation. This growth in return is the compensation required to offset the loss in purchasing power. The real return under inflation is seen to be maintaining at 5 percent will also be under the stable conditions.

This pattern of returns is characteristic of the behaviour of capital-intensive projects. We see, by compar-

Table 3

REVENUE GROWTH UNDER INFLATION

	Gross Revenue ($)		Operating Cost ($)		Operating Profits ($)		Return on Investment (percent)	
Year	G=0%	G=10%	G=0%	G=10%	G=0%	G=10%	G=0%	G=10%
1	6,000	6,000	3,500	3,500	2,500	2,500	5.0	5.00
2	6,000	6,600	3,500	3,850	2,500	2,750	5.0	5.50
3	6,000	7,260	3,500	4,235	2,500	3,025	5.0	6.05
4	6,000	7,986	3,500	4,659	2,500	3,327	5.0	6.66
5	6,000	8,784	3,500	5,124	2,500	3,660	5.0	7.32
6	6,000	9,663	3,500	5,637	2,500	4,026	5.0	8.05
7	6,000	10,629	3,500	6,200	2,500	4,429	5.0	8.86
8	6,000	11,692	3,500	6,820	2,500	4,872	5.0	9.74
10	6,000	14,148	3,500	8,253	2,500	5,895	5.0	11.79

Assumptions: inflation rate = 10 percent;
volume constant at 500 units per year;
constant real prices ($12/unit) and costs;
capital investment = $50,000;
project life is indefinite.

ison, that the rates of return pattern generated on capital in inflationary conditions is the reverse of the pattern of payments required under the conventional debt financing discussed earlier. The provision for inflation is gradual and does not provide for the sharply increased cash requirements in this initial years which are characteristic of debt financing. Nevertheless, the project could still be considered viable, in that adequate returns are available over the life of the project.

Mismatch in Cash Flows

In contrast to the front-end loading of debt servicing, the expected project returns require a delay in the recovery of lost purchasing power. Thus, we see the essence of the inflation distortion - a fundamental mismatch between the pattern of payments required by debt financing and the pattern of returns generated.

This mismatch must be bridged by funds which do not require immediate compensation. In the conventional context, we would see equity financing as the source of such funds. By comparison with the inflation-free case, the percentage of equity funds which would be required in the total capital structure is increased. Furthermore, the use of conventional debt further delays the return to equity, as available operating profits are used to meet debt servicing requirements.

The apparent weakness of projects in the initial years of operation is reflected in current accounting statements. The statement of income, if unadjusted for the impact of inflation, will understate the life-cycle earning power in initial years. At the same time, such an accounting perspective will also overstate the returns in the latter portions of the project life. Hence, the conventional tests of project viability and debt capacity are generally impaired by the impact of inflation.

Illustration of Effects on Mine Investment

Let us consider the interaction of the increases in the cost of capital and the delay in returns within the specific context, a particular mine development project. The financial projections appear in appendix 1 and are analyzed in table 4.

Table 4

FINANCIAL ANALYSIS

Case	Interest Rate (percent)	EBIT/Int[a]		EBIT/Paymt[b]		Debt/Equity		Equity Cash Flow ($ thousand)		Payback Date		Maximum Equity ($ thousand)	NPV ($ thousand
		1986	1991	1986	1991	1986	1991	1986	1991	Undisc.	Disc.		
Conventional:[c]													
Inflation = 0%	5.00	6.72	21.22	2.17	5.51	2.52	-.76	3,220	18,423	1989	1989	21,998	76,722
= 5%	10.25	3.56	13.40	1.76	5.83	2.35	-.59	2,125	28,314	1989	1990	23,601	77,863
= 10%	15.50	2.54	11.24	1.52	6.25	2.20	-.94	875	42,373	1989	1990	25,263	76,954
Indexed bond:[d]													
Inflation = 0%	5.00	6.72	24.34	2.17	4.47	2.52	-.72	3,220	16,691	1989	1989	21,998	76,229
= 5%	5.00	7.11	24.71	2.33	4.64	2.84	-.63	4,874	25,977	1989	1989	23,601	78,125
= 10%	5.00	7.49	25.08	2.50	4.81	3.21	-.59	6,726	39,403	1989	1989	25,263	78,718

[a] Earnings before interest and tax ÷ interest

[b] Earnings before interest and tax ÷ total payments

[c] Assumes equal re payments over initial 10-year period of production.

[d] Assumes capitalization of inflation portion of interest with loan repayments scaled to remaining life over initial 10-year period of production.

Characteristics of Mining Investments

Before discussing these results, some general comments on the relevance of the theory discussed to the mining context are required.

1. Costs of Capital

In the first place, the increases in the costs of capital, and more specifically in the rates of interest, are obviously general to all sectors of the economy; mine financing is clearly included in the activities which can be affected. The actual experience of high rates of interest is obvious and requires no further elaboration on its validity.

2. Prices of Output

The question of the impact of inflation on the prices and costs of mining ventures requires some qualification. First of all, commodity markets, whether we are talking of base metals, of precious metals or of energy products such as coal or uranium, are notoriously unstable in price.

Examples of commodity prices which exhibit smooth and continuous tracking of inflation are rare. The volatility of gross revenues is the rule rather than the exception. Nevertheless, studies of the long-run behaviour of metal prices show that, despite erratic fluctuations, the tendency is to maintain prices at near constant levels in real terms.

Such a relationship would also be expected from theories of the economic allocation of a resource across time. A mine deposit is a tangible commodity whose nominal value should appreciate with inflation if the other factors determining the supply and demand conditions in the market remain unaltered.

For mines of relatively long life, the average expectations that pricing of output will follow an inflationary trend are reasonable. Of course, the particular entry point on the pricing cycle is still critical to the short-run success of the venture. Such a consideration would be even more critical for mines with a short life. But, by parallel logic, if current pricing is judged to be depressed, above-average price increases may well be expected. Clearly, a thorough market assessment of the specific circumstances for any given venture is essential to the determination of suitable pricing scenarios for analysis.

Without dismissing the relevance and importance of such a study, it is still justifiable to claim that, for many potential mine developments which may be assessed, it is reasonable to expect that prices will increase under inflation. Many determinations make this assumption implicitly, through the use of constant real prices in their analysis.

3. Costs of Input

On the cost side, the mining venture generally includes a factor which has hitherto been excluded from the discussion. This element is the depletion phenomenon which must eventually decrease the effective quality of the ore being mined and will thus result in expectation of rising real costs per unit of marketable product. Depending on the size and quality of the orebody, this rising real cost may be immediate and severe or be delayed until toward the end of a long mine life. Since efficiency suggests that the richer portions of the orebody should be mined first, the general tendency will be for some increase in real costs over time.

With inflation, it is clear that operating costs are directly related through wages, energy costs and material prices. Operating costs should thus be forecast to rise at least at the rate of inflation. Some offsets can occur through technological improvements, but such changes are generally restricted to improvements in new mines relative to older ones. In combination with depletion, the operating costs of a mine may thus increase more rapidly than the rate of inflation. Again, specific engineering studies of the orebody are required to determine the likely scenario for any given mine venture.

The higher the levels of inflation, the more significant is the inflationary factor relative to depletion which might be considered to be fixed by nature. Under such circumstances, the operating profits of a mine will still show growth generally linked to inflation at least for a number of initial years of mine life. Furthermore, the higher the capital intensity of the mine, the less significant will be the operating costs relative to the gross revenue; again, an operating profit linked to growth in commodity prices should result.

Illustration of Project Economics

With the above qualifiers, let us turn to the mine development projections of appendix 1. The basic assumption of the analysis is that the prices are expected to remain constant in real terms: i.e. they increase with inflation. A common assumption in terms of inflationary growth is imposed on both output prices and input costs. Depletion is included in the output considerations in the venture. At the same time, an increase in capacity after an initial 3-year period through further capital investment was also an element of the venture under consideration and is included in the model.

To study the impact of inflation on the financing of the venture, the gross incomes and operating costs are projected over the 20-year assumed life of the project under alternative inflationary scenarios. The financing module assumes two alternate means of financing:

i the conventional bond with interest payable on the balance outstanding and level repayments over the initial 10 years;
ii a so-called indexed bond, under which only the real interest rate is payable while the inflationary component is added to the principal and the loan is again amortized over the initial 10 years.

Consideration of table 4 provides insight into the problems created by inflation. Columns 2 and 3 indicate the impact of inflation on the coverage ratio. Under conventional debt financing (which was assumed to be 60 percent of capital investment), the coverage of interest payments in the initial year of operations falls from 6.72 to 2.54 as inflation rises from 0 percent to 10 percent. With a corresponding fall of the total payments' coverage ratio from 2.17 to a precarious 1.52, the acceptability of the project to lenders may be questionable. Of course, consideration of the 1991 results clearly shows the coverage problems to be strictly temporary. Under the higher inflation levels, the relative coverage of payments has reversed positions within the 5-year period. The drastic effect on the equity cash flow should be noted, with initial 1986 flow reduced from $3,220K to $875K with inflation, with complete reversal by 1991. Similarly, the need for deferring equity returns can be seen in the year of project payback which, on a discounted basis, can be seen to have increased by a year. The final columns, which give the maximum equity investment required, and the net present value of the project, indicate that, ultimately, the project is being forecast as being highly profitable under all three scenarios.

The results indicate the distortions and increased difficulty in financing a mine development project created by the result of inflation. While the range of possible corrections is discussed in the following section, the lower portion of table 4 demonstrates the basic approach to financing which is required. If the effects of inflation are to be eradicated, the financing must fit more closely with the pattern of returns. The financial results of using the concept of an indexed bond can be seen to minimize inflationary distortion. Thus, we see coverage ratios stable under each inflationary scenario. Likewise, the initial year cash flows to equity are no longer drastically reduced, while increasing more moderately in future years. Similarly, payback periods are held constant.

These effects are created by the recognition of the effective shortening of borrowing duration which occurs with inflation. By requiring only the real portion of interest to be payable, a pattern of repayment which is more in keeping with available project cash flows has been created.

Remedies Required in Financial Markets

A key element for improving the performance of the financial markets in mine financing must be an increased awareness of the nature of the distortions created by inflation. As demonstrated above, a project which is otherwise totally viable and unaltered in real terms, suffers by traditional measurements of debt-carrying capacity.

Indexed Bonds

The creation of indexed bonds which would eliminate the front-end loading of debt repayments is, at least for the present, hindered by institutional factors. The offering of such a financing vehicle would require the parallel development of indexed deposits which would match the portfolios of financial institutions. Such markets do not at present exist and would require extensive re-education of depositors.

Of course, the increased duration of the indexed bond is recognized as increasing the risk borne by the lender. Since a portion of the yield is delayed, more of the loan is dependent on future events. With high degrees of instability introduced by inflation, the confidence in future returns is diminished. A continuation of past lending criteria may partially reflect general insecurity felt about the future.

Borrowers, on occasion, also resist the issuance of indexed bonds. The implied liability is open-ended. In effect, if the timing of general inflation rates to which bonds may be linked and the specific price increases of the mine output are not well correlated, the issuer may bear increased risks. Without a fiscal rate of interest, the future financing costs, while possibly better matched, are still unknown and create the risks of uncertainty.

Commodity Bonds

A novel solution to this extra problem which has appeared is the commodity bond. Such a bond has the principal linked specifically with the value of a given commodity. Thus, for example, the issuer of a gold bond would provide for a small interest yield on the bond, but would guarantee the repayment of principal based on the equivalent value of a fixed amount of gold. In this fashion, an operator of a gold mine could reduce his risks from the fluctuating value of gold. At the same time, investors may see the gold bond as an inflationary hedge and require only lower (real) levels of interest.

Repayment Schedules

The more pragmatic resolutions to the problem of inflationary distortion lie in more flexible negotiations on repayments. In particular, the growth of project financing through the chartered banks has seen repayment schedules negotiated on a more flexible basis. For a number of major projects, we see the level of repayments being linked to the cash flow available from operations. Such solutions implicitly recognize the distortions of inflation and increase the range of projects which can be financed.

Project financing through banks has, however, also brought variable rates of interest linked to the movement of the prime rate. While avoiding the problem of lock-in of costs at unfavourable interest rates, the variable rate does not solve the problems of front-end loading which we have been discussing. To a degree, they have exacerbated the problem, as very temporary increases in rates must be met with current payments while longer-term inflationary expectations may lie substantially lower.

Increased Equity

The final solution to the front-end loading of debt financing is to increase the level of equity relative to the debt in the capital structure. Such a solution clearly meets the matching problems due to the flexibility of the payment of return to equity. However, the relative size of the market for new equity funds and their undesirable time implications limit the attractiveness of such a solution. With increasing problems in internal cash generation, fewer companies will be able to rely strictly on internal equity cash flow for investment needs. In effect, reliance on equity is the growing admission of a failure of the capital markets to provide balanced financing.

Other industries, it must be recognized, are also faced with the same general problem of financing and front-end loading. Most significantly, the National Energy Board has recognized front-end loading of costs in the regulated pipelines as a major impediment to capacity expansion, particularly in the Arctic. A recently held conference under NEB sponsorship explored the possible solutions to the problem. For the present, only temporary and ad hoc adjustments have been explicitly introduced.

Conclusions

In conclusion, it is hoped that the present improving trends in inflation will prove to be continuing and bring more permanent price stability. Such a change in our economic scenario assumptions would greatly improve the financing possibilities for new mine ventures which have been drastically distorted for almost a decade. Failing such favourable developments, improved recognition of the problem and restructuring of lending practices and financial markets are required. Assuming increased economic activity and improved levels of pricing and demand, the ability to provide expansion capital for mine development would be enhanced by such structural improvements, and aid in the recovery process.

APPENDIX: PROJECT EVALUATIONS*

MINE DEVELOPMENT ANALYSIS - CONVENTIONAL

(tons,units,dollars 000)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
INFLATION %	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
INDEX	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36
PRODUCTION										
ORE MILLED				175	175	175	350	350	350	350
TOT STU REC				219	219	219	437	437	425	385
PRICE($/STU)				206	227	250	275	302	332	365
CAPITAL EXP	13000	38500	47795			35431	1250	1250	1250	1250
CCA	3900	14280	24335	17034	11924	18976	13658	9936	7330	5506
REV AND EXP										
SALES REV				45078	49585	54544	119859	131845	141209	140528
COSTS				22760	25036	27540	47744	52518	57448	61778
OPERATING				14000	14000	14000	20750	20750	20750	20750
HANDLING				2500	2500	2500	5000	5000	4900	4400
COMMISION				600	600	600	1200	1200	1150	1050
TOTAL-REAL				17100	17100	17100	26950	26950	26800	26200
OPER PROFIT				22318	24549	27004	72116	79327	83761	78750
INC TAX	-1326	-4855	-8274	1796	4293	2730	19876	23593	25986	24903
ROYALTY							2885	3173	3350	3150
OP CASH FLOW	1326	4855	8274	20521	20257	24275	49356	52561	54424	50697
WORKING CAP				7986			5315			
NET CASH FLOW	-11674	-33645	-39521	12535	20257	-11157	42791	51311	53174	49447
FINANCING										
DEBT	7800	30900	59577	53619	47662	62963	57005	51047	45090	39132
INT RATE %	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50
INTEREST				8773	7849	8573	9297	8374	7451	6527
PRINCIPAL				5958	5958	5958	5958	5958	5958	5958
TAX SHIELD				3070	2747	3001	3254	2931	2608	2285
COVERAGE				4145	3709	4051	4393	3957	3520	3084
EBIT/INT				2.54	3.13	3.15	7.76	9.47	11.24	12.06
EBIT/PAYMT				1.52	1.78	1.86	4.73	5.54	6.25	6.31
EQT CASH FLOW	-3874	-10545	-10844	875	9197	-1428	30790	39910	42373	39246
CUM CASH FLOW	-3874	-14419	-25263	-24388	-15191	-16619	14171	54081	96454	135701
DEBT/EQUITY	2.01	2.14	2.36	2.20	3.14	3.79	-4.02	-.94	-.47	-.29
DISC RATE	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155
CUM NPV	-3354	-11259	-18297	-17805	-13331	-13932	-2703	9898	21482	30772

* Cases using different rates of inflation are available from the author.

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
2.59	2.85	3.14	3.45	3.80	4.18	4.59	5.05	5.56	6.12	6.73	7.40	8.14	8.95
350	350	350	350	350	350	350	350	350	350	350	350	350	350
354	351	345	345	201	201	201	201	201	201	201	201	201	201
402	442	486	535	589	647	712	783	862	948	1043	1147	1262	1388
1250	1250	1250	1250	1250	1250	1250	1250	1250	1000	750	0	0	0
4229	3335	2710	2272	1965	1751	1601	1495	1422	1295	1132	792	555	388
142118	155003	167584	184343	118017	129818	142800	157080	172788	190067	209074	229981	252979	278277
66659	73325	80344	86378	88482	97330	107063	117769	129546	142501	156751	172426	189668	208635
20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750
4000	4000	3900	3900	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
950	950	950	950	550	550	550	550	550	550	550	550	550	550
25700	25700	25600	25600	23300	23300	23300	23300	23300	23300	23300	23300	23300	23300
75458	81678	87240	95965	29535	32489	35737	39311	43242	47566	52323	57555	63311	69642
24218	26636	28740	31855	9374	10451	11607	12857	14219	15732	17405	19300	21337	23546
3018	3267	3490	3839	1181	1300	1429	1572	1730	1903	2093	2302	2532	2786
48222	51774	55010	60270	18980	20738	22701	24881	27294	29932	32825	35954	39441	43310
													-80589
46972	50524	53760	59020	17730	19488	21451	23631	26044	28932	32075	35954	39441	123899
33174	27216	21259											
15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50
5604	4680	3757	1648	0	0	0	0	0	0	0	0	0	0
5958	5958	5958	21259	0	0	0	0	0	0	0	0	0	0
1961	1638	1315	577	0	0	0	0	0	0	0	0	0	0
2648	2211	1775	778	0	0	0	0	0	0	0	0	0	0
13.47	17.45	23.22											
6.53	7.68	8.98											
37372	41524	45361	36691	17730	19488	21451	23631	26044	28932	32075	35954	39441	123899
173073	214597	259958	296649	314379	333867	355318	378949	404993	433925	466000	501953	541395	665294
-.19	-.13	-.08	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155
38430	45798	52766	57646	59687	61630	63482	65248	66933	68554	70110	71619	73054	76954

MINE DEVELOPMENT ANALYSIS - INDEXED

(tons,units,dollars 000)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
INFLATION %	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
INDEX	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36
PRODUCTION										
ORE MILLED				175	175	175	350	350	350	350
TOT STU REC				219	219	219	437	437	425	385
PRICE($/STU)				206	227	250	275	302	332	366
CAPITAL EXP	13000	38600	47795			35431	1250	1250	1250	1250
CCA	3900	14280	24335	17034	11924	18976	13658	9936	7330	5506
REV AND EXP										
SALES REV				45078	49585	54544	119859	131845	141209	140528
COSTS				22760	25036	27540	47744	52518	57448	61778
OPERATING				14000	14000	14000	20750	20750	20750	20750
HANDLING				2500	2500	2500	5000	5000	4900	4460
COMMISION				600	600	600	1200	1200	1150	1050
TOTAL-REAL				17100	17100	17100	26950	26950	26800	26200
OPER PROFIT				22318	24549	27004	72116	79327	83761	78750
INC TAX	-1326	-4855	-8274	1796	4293	2730	19876	23593	25986	24903
ROYALTY							2885	3173	3350	3150
OP CASH FLOW	1326	4855	8274	20521	20257	24275	49356	52561	54424	50697
WORKING CAP				7986			5315			
NET CASH FLOW	-11674	-33645	-39521	12535	20257	-11157	42791	51311	53174	49447
FINANCING										
DEBT	7800	30900	59577	59577	58915	78701	75328	70306	63276	53784
INT RATE %	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
INTEREST				2979	2962	3440	3951	3641	3340	2926
PRINCIPAL				5958	6620	7364	11243	12555	14061	15819
CAP INT				5958	5958	5892	7870	7533	7031	6328
TAX SHIELD				3128	3122	3266	4102	3911	3630	3239
COVERAGE										
EBIT/INT				7.49	8.29	7.85	18.73	21.79	25.08	26.91
EBIT/PAYMT				2.50	2.56	2.50	4.78	4.90	4.81	4.20
EQT CASH FLOW	-3874	-10545	-10844	6726	13797	2564	31800	39026	39403	33940
CUM CASH FLOW	-3874	-14419	-25263	-18537	-4740	-2176	29623	68650	108052	141993
DEBT/EQUITY	2.01	2.14	2.36	3.21	12.43	36.15	-2.54	-1.02	-.59	-.38
DISC RATE	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155
CUM NPV	-3354	-11259	-18297	-14517	-7805	-6725	4672	17195	27966	36000

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
2.59	2.85	3.14	3.45	3.80	4.18	4.59	5.05	5.56	6.12	6.73	7.40	8.14	8.95
350	350	350	350	350	350	350	350	350	350	350	350	350	350
354	351	346	345	201	201	201	201	201	201	201	201	201	201
402	442	486	535	589	647	712	783	862	948	1043	1147	1262	1388
1250	1250	1250	1250	1250	1250	1250	1250	1250	1000	750	0	0	0
4229	3335	2710	2272	1966	1751	1601	1495	1422	1295	1132	792	555	388
142118	155003	167584	184343	118017	129818	142800	157080	172788	190067	209074	229981	252979	278277
68659	73325	80344	88378	88482	97330	107063	117769	129546	142501	156751	172426	189668	208635
20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750	20750
4000	4000	3900	3900	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
950	950	950	950	550	550	550	550	550	550	550	550	550	550
25700	25700	25600	25600	23300	23300	23300	23300	23300	23300	23300	23300	23300	23300
75458	81678	87240	95965	29535	32489	35737	39311	43242	47566	52323	57555	63311	69642
24218	26636	28740	31856	9374	10451	11607	12857	14219	15732	17405	19300	21337	23540
3016	3267	3490	3639	1181	1300	1429	1572	1730	1903	2093	2302	2532	2786
48222	51774	55010	60270	10980	20736	22701	24881	27296	29932	32825	35954	39441	43310
													-80589
46972	50524	53760	59020	17730	19486	21451	23631	26044	28932	32075	35954	39441	123899
41235	24741	2474											
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
2375	1649	680	62	0	0	0	0	0	0	0	0	0	0
17928	20617	24741	2474	0	0	0	0	0	0	0	0	0	0
5378	4123	2474	247	0	0	0	0	0	0	0	0	0	0
2714	2020	1104	108	0	0	0	0	0	0	0	0	0	0
31.77	49.52	128.23											
3.72	3.67	3.43											
29383	30278	29443	56346	17730	19488	21451	23631	26044	28932	32075	35954	39441	123899
171375	201653	231096	287442	305172	324660	346111	369743	395786	424718	456793	492747	532188	656087
-.26	-.12	-.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155
42021	47393	51916	59410	61452	63395	65240	67012	68649	70318	71874	73384	74818	78718

LIMITED RECOURSE FINANCING

Steven Greenwald

Introduction

The title of the seminar for which this study was originally written was 'Financing for survival in the Eighties'. 'Survival': it paints a picture of crisis. Capital crisis. Banking crisis. Energy crisis. In all of this talk of crisis I am reminded that the Chinese pictogram for the word 'crisis' is a combination of the characters for 'danger' and 'opportunity'. Which of these two components predominates will depend in large part on how thoughtfully the Canadian mining industry approaches fulfilling its capital needs. I would like to address the issue of financing Canadian mining projects in terms of the worldwide trend towards financing large-scale projects on a limited or non-recourse basis. This trend has been apparent the past several years, and there have been several financings in which new ground has been broken in terms of the project risks which lenders have agreed to assume.

There is no need to tell you that the outlook for new energy resource projects, at least for the medium term, is very much less optimistic than it was two or three years ago. Economic activity in the developed world may be very restrained in the near term despite expectations of a recovery. A resumption of growth, while widely expected by the mid-1980s, is by no means assured.

The lower growth in projected demand has been reflected in current prices of the major fuels and commodities and in future price expectations. The combination of reduced expectations for demand and prices has greatly affected the perceived profitability of many energy resource projects which, two years ago, offered the prospect of good investments for sponsors and sound financing opportunities for lenders. Although it can be argued that there has been an over-reaction to short-term trends, there is no doubt that energy and natural resource projects today face a very different environment compared with a few years ago in terms of markets, financing costs, and the perceptions of investors and bankers. Uncertainty is high, confidence is low. The analysis of risks has therefore assumed greater importance than ever.

A Personal Perspective

Let me share one basic attitudinal problem I have encountered in the course of my personal odyssey. I counsel against extremism. As we try to allocate risks, responsibilities and rewards associated with a project, raising the decibel level has little value. For example, in the crucial negotiation between borrower and lender, the borrowers themselves are often still fumbling to understand and articulate how they want to participate in this new game of limited recourse financing. Waving the banner of a fanatic and leaping across a conference table shouting 'I am entitled to abandon' is probably not going to solve the problem.

Sadly, the capital markets are themselves in such a state of flux that the half-life of any information I can supply may be so short as to be only marginally useful. Therefore, I have opted to try to outline a framework, a methodology for looking at limited recourse financing. Based on my experience, the procedure is accurate, but the answer as to the optimum financing terms is unique to each project.

I approach this subject from the perspective of an investment banker. Our experience is not as a lender to projects, but as a financial advisor to project borrowers, representing them in their negotiations with a wide range of funding sources, including commercial banks, export credit agencies, supranational agencies, institutional lenders, the Eurobond, commercial paper and Euronote markets, and private capital. For the past several years, we have specialized in advising project sponsors on how to obtain limited or non-recourse financing.

Definitions

First, we should define some terms. By 'non-recourse' project financing, we mean a loan to a project where lenders look solely to the cash flow and assets of the project for repayment of their debt. If the owners of the project do not guarantee the borrowing, and if the lenders have no recourse to the project owners in the event that the project cannot repay the loan, then we call the loan 'non-recourse'. With such a loan, the lender certainly has recourse to the cash flow and assets of the project, but the cash flow and assets of the project owners are protected from the project lender if the project is a failure.

One rarely encounters true non-recourse financing. Lenders generally are not prepared to lend on a non-recourse basis. While lenders may be 'risk-sharers', they are not providers of 'high-risk' funds. Consequently, either they lend directly to the project owners or, if they lend to a project entity, they generally insist upon and receive some form of credit support. Such credit support may come from the project's owners, or from its customers or suppliers, or from a third party such as the host country government or a government export credit agency. Ultimately lenders want to be able to look to creditworthy entities to back up the project's obligations. This additional credit support may take the form of a direct guarantee of the project's debt by the project's owners. Or it may be provided by means of contractual arrangements such as 'take-or-pay' contracts or 'keepwell' agreements which effectively are guarantees of the project debt, although they are guarantees by an indirect means. Whenever a lender has a direct or indirect guarantee of its loan from a project owner, we describe its loan to the project as a 'full recourse' loan.

Simply put, in the case of a 'limited recourse' loan, a lender assumes some project risks, but not all. It is upon this form of financing which we at First Boston have concentrated most.

Let me digress for a moment and clarify an often misunderstood concept: 'off-balance-sheet financing'. I believe it worthwhile to point out that:

i a sponsor or project can have a full recourse loan which is not recorded on his balance sheet (e.g., a partnership borrowing for which he is liable, yet by controlling an insufficient interest the debt may not be recorded on his balance sheet);

ii conversely, a sponsor can have a non- or limited recourse loan which is on his balance sheet (e.g., a single-sponsor project which borrows on such a basis).

The former may be viewed as off-balance-sheet/on-credit, while the latter is on-balance sheet/off-credit. By the late 1970s, the term 'project financing', as most people used it, became synonymous not with off-credit or non-recourse financings, but rather with off-balance-sheet financing. Many corporations entered into complicated project finance arrangements purely to achieve accounting objectives. These corporations believed that by eliminating project debt from their balance sheet they could preserve their corporate borrowing capacity and maintain their credit ratings. And for a while they could.

Unfortunately for them, the accounting profession has become more adept at dealing with project financing arrangements. Accountants have become less influenced by the form these arrangements take and more by the substance. Where a contract requires a corporation to pay for the output of a project whether or not produced by the project (i.e. 'take-or-pay'), or where an agreement contains a requirement for a corporation to make payments designed to produce a fixed return to a third party, accountants are getting used to saying that such obligations of the corporation are in the nature of debt and are not merely commercial undertakings. They are requiring capitalization or, at the very least, disclosure in the footnotes to the financial statements of most forms of these full recourse project financings.

In the United States, the independent credit rating agencies, which wield considerable influence with the ratings they assign to the public debt issues of corporations, have also become used to attributing full recourse project debt to these corporations even if the accountants do not. And sophisticated lenders considering making loans to such corporations are also attributing full recourse project debt to these corporations. Consequently, full recource project financing, whether on- or off-balance sheet, can affect a company's debt capacity just as much as corporate financing; hence, the concern of many corporations about the degree to which their credit is exposed. Corporate treasurers today seem less concerned with accounting gimmicks and more concerned with the risks to which their corporations become exposed as new projects are undertaken.

Concern with Risk

During the past decade, the capital needs and economic risks associated with new commercial investments have grown dramatically. Pressures of increasing economies of scale, technological change and inflation have risen to the point where the financial risks of new mining or industrial projects can be significant even for governments or large corporations.

Consequently, many of our clients are looking for ways to segregate project risk from their existing operations and to seek out lenders who are prepared, for a price, to assume some project risks. Their goal is to structure project financing in which recourse to themselves is limited to defined circumstances or in which there is no recourse at all beyond the amount of equity capital contributed.

Over the last few years, we have identified some lenders who are prepared to take many project-related risks. These lenders would not have taken such risks five years ago. There are several reasons why they can, and often do, take these risks today. First, these are extremely knowledgeable lenders who have hired mining engineers and have industry specialists on their staff, and are better able to assess project risks and to judge which risks they can absorb. Secondly, there is competition among banks for loans to high quality projects. By taking on project loans, banks can often (although not always) obtain higher spreads than with full recourse loans. Thirdly, bank loans may not be cost-competitive with other sources of funds such as commercial paper for full recourse financings. Consequently, certain banks are willing to make loans involving more risk to avoid competing directly with commercial paper.

Risk Allocation

How can project sponsors limit lenders' recourse? Among the risks to be analyzed and allocated between a mining project's sponsors and its lenders are the following.

Participant Risk

The participant risk is the risk that there are one or more financially weak participants in the project which may then default on its obligations. For example, will failure to pay its agreed share of construction costs or its share of maintenance capital expenditure be an event of default on the project loan? If the project is an unincorporated joint venture, and project loans are with the individual participants, will there be a cross-default on their loans? Will the other participants obligate themselves to step up and cover that participant's share? Or will the lenders take the risk that the other participants may not step up for that share?

In our experience, there are very limited opportunities for having lenders take the participant risk, so the negotiating range is usually whether a participant's default automatically triggers a cross-default, or whether it will only constitute a cross-default if the other participants do not proportionately step up their commitments. Even in a truly non-recourse loan, the project owners' obligation to contribute their agreed shares of the project equity is absolute.

Completion Risk

The completion is the risk that construction of the project will not be completed or, if it is completed, that it will not be completed to production specifications, within the budgeted cost, or on time.

In a full recourse financing, the project owners guarantee the lenders as a matter of course that the project will be completed. Generally, there is a financial definition of completion in addition to a mechnical definition of completion. The financial definition is designed to ensure that the project, while being physically complete, is also capable of generating the projected cash flow.

Project owners can guarantee completion in several ways. For example, they might be asked to agree, in the event that the project is not completed by a specified date, to pay off their share of the project debt. Alternatively, project owners might guarantee completion not by paying off the debt in one lump sum payment, but by agreeing to assume the project debt as if it were their own debt. In this case they would be obligated to pay off the debt out of their own funds as it matured.

A third way for project owners to guarantee completion is not to agree to pay off or assume the project debt, but instead to agree with the lenders to pay for any construction cost overrun with equity; i.e., to pay all costs incurred to bring the project to completion over the budget or base case costs presented to lenders. While this third approach avoids an explicit guarantee of the project debt in the event of non-completion, many lenders regard this as an effective guarantee of the project debt. This is because the economic reality of such an open-ended equity commitment by the project owners is that, at some point, they may be forced to pay off the project debt to avoid pouring in good money after bad in the form of more and more equity.

In a limited or non-recourse financing, lenders may take the completion risk. In such a case, the project sponsors may agree to contribute an amount of equity towards construction of the project. The lenders provide an agreed amount of debt. Together, these amounts are expected to be sufficient to meet the costs of constructing the project. These amounts usually have built into them a provision for potential cost overruns. However, at some level of cost overrun, these amounts will be insufficient, and in a non-recourse financing, only a finite amount of debt and equity will have been pre-committed. Once that amount has been expended, sponsors have no further legal obligation to contribute more money. Nor have they agreed to pay off or assume the project debt. Rather than have a partially built project, the lenders may expend the money to finish it. Of course, if the amount required to complete the project is minor, the sponsors may elect to complete it, but they cannot be forced to.

As you might expect, such non-recourse financing is very rare. However, there are some lenders who have assumed the completion risk. We have had recent experience advising four projects, involving three different industries, located in three different countries, where lenders took the completion risk. The total amount committed by lenders for these four projects was $2 billion.

In what situation will lenders take the completion risk? If you were to analyze these three situations, in each case the lenders had to be convinced of an extremely low risk of the project not being completed within the pool of committed debt and equity capital. There should be an absence, or very low degree, of technological risk. It is helpful if procurement of delivery items with long lead-times has been achieved so that such items will not hold up construction. Prior experience of the operator in successfully completing similar projects close to budget is another helpful factor. The lenders who take these risks prefer projects with a natural resource base, which would provide additional collateral beyond the physical facilities being constructed. The calibre of the project owners is as critical to these lenders as the economics of the project. These lenders will only lend on this basis for project sponsors who are well-managed and financially sound. In essence, lenders must perceive either an ample pool of funds to complete construction or sponsors who would not 'walk away' for a small additional equity commitment.

Raw Material Supply Risk

In making project loans, lenders will be concerned to see that raw materials, including energy, are owned by the project or available to it under contract.

In mining projects, some lenders will accept the reserve risk after their own or independent evaluation of the mine reserves. As a general rule, many lenders require that mineable reserves be about twice as large as the volume of minerals to be mined during the mining period (i.e. the loan repayment period does not exceed more than half of the mine's life). Other lenders may insist on a warranty from the project owners that the reserves represented to be in the ground are as they are claimed to be by the project owners.

Production Risk

The production risk is the risk that the project will experience an operating difficulty and will not be able to generate sufficient cash flow to service its debt. If the project owners contribute experienced management to the venture, and no new technology is involved, lenders may take the risk that the mines and facilities operate at less than rated capacity. It may be necessary for the owners to enter into an agreement with the venture to provide certain technical or managerial support if required, and this agreement would be assigned to lenders as part of their security package. However, the owners should be able to limit their obligations in this respect to those of a 'prudent operator'.

Market Risk

The market risk is the risk that the project cannot sell its output (volume risk) or that the output cannot be sold profitably (price risk). Generally, in a project financing, a substantial portion of the project's output should be covered by some form of long-term contract extending beyond the loan life. Ideally, such contracts should be with reliable and creditworthy customers and adequately cover escalation in operating costs. Even better, the contracts might have a floor price designed to cover the project's cash costs at some assumed level of capacity utilization.

The extent to which lenders will take the market risk depends on the project's ranking as a low cost producer, the quality of its production and the degree to which the production is covered by firm, long-term sales contracts. We have succeeded in having lenders take some of the market risk for three coal mining development projects which we assisted in raising $1.5 billion of limited or non-recourse debt in the past two years. In each of these financings, the mines were projected to be low cost producers, the quality of the coal was high and the market risk was mitigated by the presence of sales contracts. However, in none of these cases were the contracts of the 'take-or-pay' variety (i.e., where the purchaser agrees to pay amounts sufficient to amortize the project's debt whether or not the product is actually delivered); instead, they were on a 'take-if-delivered' basis (i.e., the purchaser pays nothing if the product is not actually delivered). In each case the contracts, while firm, were 'commercial' in nature, in that performance was excused for certain events of force majeure.

In assessing any such sales contracts, lenders will consider all of the following:

- the role of the purchaser, whether as middleman or end-user;
- the purchaser's financial capability and its need for the contracted volumes (e.g. whether it forms part of the purchaser's base requirement);
- the business of the purchaser (e.g., manufacturer, utility, etc.) and the vulnerability of that sector to business downturns;
- the terms of the contract and circumstances under which the purchaser has the contractual right to reduce its purchases below the specified contractual volumes;
- product quality specifications and penalties for shipments other than according to specifications;
- control of product shipping arrangements;
- price re-openers.

Take-or-pay contracts are not usual. Coal contracts, which may be long term or evergreen, usually contain a base annual volume and price, plus provisions for variations in volume and adjustments of the price. The contract might provide for volume to be varied by, say, 10 percent over or 20 percent under the base volume.

However, experience has taught lenders to scrutinize closely these contract provisions and the commercial practice of buyers in adhering to the letter of the contract. The Japanese, for example, as a matter of commercial philosophy, view contracts differently from Americans and Canadians.

In considering financing coal projects, lenders will need to give increased attention to assessing what the volumes might be if the buyer's industry undergoes a prolonged period of depressed demand. The pricing provisions of coal contracts also require careful analysis by lenders. The contract may provide for all or, say, half of the price to be escalated, based on increases in labour and other costs.

While it is clear that a mining project in operation is in a better position to negotiate sales contracts with specific buyers than a mining project still in the development stage, lenders typically take a conservative approach in establishing loan values attributable to the potential cash flow from sales of uncontracted production tonnage. In some cases, the projected value of such sales in the eyes of lenders may be 30 percent to 50 percent below that of contracted sales.

Force Majeure Risk

Force majeure events are those outside the control of either the borrower or the lender, such as strikes, floods and the like. Certain disasters would doubtless be insured against. Non-recourse lenders might like to see the venture take out insurance policies for events against which the project owners might self-insure. But lenders could usually be expected to bear certain risks of temporary production interruption due to force majeure.

Abandonment Risk

The abandonment risk is the risk that the project owners will abandon the project before the lenders have been repaid. Just as project lenders want to see the project completed and come into existence in order to produce the cash flow to repay the loan, they want to see the owners continue to operate the project as long as there is the chance that the loan can be repaid from project cash flow. In mining projects, there is usually a test based on historical and projected cash costs and cash revenues. If actual costs exceed actual revenues for a specified period of time, and if the test for projected costs and revenues is also met, then the operator may close the mine. Otherwise, it must continue to operate the mine and pay the costs of mining. Depending on the test, this can be a substantial economic burden on the project owners, who may find their ability to abandon the project to be extremely limited, possibly resulting in what is tantamount to a guarantee of debt. Project owners need to know what is reasonable for lenders to receive in such a test.

Production Payments

I would now like to say a word about production payments, a form of project financing--or rather a variety of forms--which is much misunderstood. Some lenders have suggested that production payments they have proposed are non-recourse or limited recourse loans when, after careful analysis, they are tantamount to full recourse loans. I look principally at three key areas in a production payment proposal:

Completion Test

Is it joint and several? If several, is the lender suggesting that the joint venture agreement be made joint and several? Is it open ended in terms of equity commitment? How is force majeure dealt with? The answers to these questions determine whether the production payment proposal is starting out on a full recourse, limited recourse or non-recourse basis.

Operating Period Obligations

Do the owners have to do more than operate the mine by applying generally accepted mining practices and obeying applicable laws and regulations ('prudent operator' obligations)? Has the lender asked to receive 'gross proceeds' or 'net proceeds'? If the gross proceeds are dedicated to loan repayment, then the lenders may receive all the proceeds of sale, leaving the project owners with the obligation to pay all the mining costs and any required ongoing capital expenditures out of their own pockets. So much for limited recourse during the operating period.

Abandonment Test

I have seen proposals which have made no reference to the abandonment test, or have merely said that 'an economic test' (whatever that is) will be applied. The true intent of the lender often emerges later in the final documentation stage. At that stage, I have seen abandonment tests so onerous that they could not be satisfied in almost any real-world circumstances. And if the test cannot be met, the owners must continue to operate the mine. In such a circumstance, they can be held to ransom by the lenders until they 'voluntarily' pay off the loan out of their corporate funds. With such an onerous test, I would call that loan full recourse.

If I sound somewhat suspicious and cynical, I am. That is what I am paid to be, because I work for borrowers. On the other hand, I do not blame loan officers for reaching for as much credit as they can. That is what they get paid for.

My advice to corporate treasurers is: what you will get paid for in the future is hanging on to your corporate credit and limiting the recourse to your company in project financing.

Case Studies

I would now like to discuss briefly some projects which we recently assisted as financial advisor, in which lenders provided limited or non-recourse debt financing.

1. In 1980, we closed the financing of a $200-million paper mill in Maine. This was a project owned by two very unequal credits, The New York Times and a small family-owned Finnish paper company, Myllykoski Oy. The Times had several projects under way and the company had no desire to place the newspaper's credit on the line, even with the opportunity to get into the business as a paper supplier. The result was a $160-million limited recourse loan and $22 million of Finnish export credits, which were subordinated. There was no completion guarantee and the sponsors, who collectively provided up to $44 million of equity (including overrun equity) retained the right to abandon if it proved uneconomical. In addition, there were sales contracts in place for less than half the output. Fortunately, we found some very sophisticated lenders who intimately understood the forest products industry. The Times could have borrowed more cheaply in the public markets, but to quote Times' Treasurer Denise Fletcher, 'We had to do it non-recourse, or not at all'.

2. In December 1981, we closed a financing of $345 million (equivalent) of 15-year debt for a coking coal mine development in Queensland, Australia on a non-recourse basis. The project is 21 percent owned by three European steel producing companies and 79 percent owned by a major Australian mining company, MIM. Between them, the European mills signed 15-year contracts to purchase 75 percent of the project's annual production of 2.25 million tonnes on a 'take-if-delivered' basis (i.e., not a 'take-or-pay' contract in which the purchaser pays amounts sufficient to amortize the project's debt whether or not the product is actually delivered, but a contract in which the purchaser pays nothing if

the coal is not delivered). The contracts obligate the purchasers to pay all the project costs provided a certain tonnage (approximately 66 percent of capacity) is shipped each year. However, under certain events of force majeure, their obligation to 'take-if-delivered' is excused. Incidentally, as in Madison Paper, there was no completion guarantee.

3. In July 1982, we closed a financing of $414 million of 15-year limited recourse debt for the Wyoming Powder River Basin Coal Transportation Project sponsored by the Union Pacific Corporation and Chicago & North Western Transportation Company. This is a project to construct and rehabilitate rail lines and facilities to transport Powder River Basin coal to markets in the mid-west and southern portions of the United States. This financing was effected without any transportation contracts.

4. In August 1982, we closed a financing of $450 million of 12-year debt for the Blair Athol steaming coal mine development in Australia on a limited recourse basis. The project is owned 50.2 percent by a major Australian mining company, 15.4 percent by a large international petroleum company, 12.2 percent each by two Australian industrial companies, and 10 percent by various Japanese utilities. The utilities signed 15-year contracts to take 100 percent of the mine's annual production of 5 million tonnes at an agreed price with escalation indices. The contracts are commercial in that certain events of force majeure excuse the buyers' performance.

Multi-Market Credit Facility

Last year, MIM once again asked us to advise them on another coal mine development project. In August 1982, we obtained firm commitments of $700 million for Newlands-Collinsville, 100 percent owned by MIM. There is one aspect of the deal which we believe to be of general interest: the multi-market credit facility. Under this arrangement, some banks, rather than providing loans to the project, provide letters-of-credit (LOCs) on identical terms to the loans. These LOCs are then used to backstop other sources of funds. The credit function is being distinguished from the funding function. In Australia, our initial motivation was to bring banks into the transaction which had no ability to absorb Australian withholding tax. By using LOCs to support securities exempt from withholding tax, such as short-term Euronotes or U.S. commercial paper, we were able to broaden the offering to those lenders. Three other side benefits rapidly emerged. First, lenders who would not have made a loan, but who are sensitive to the 'return on asset criteria', suddenly found an LOC a very attractive investment. Second, some of those banks participating in the LOC facility were able to benefit from all the fees associated with the LOC plus enjoy the rights of underwriting the Euronotes or selling the commercial paper. The resultant overall yields became very attractive. Third, and from our client's point of view perhaps most important, MIM's cost of money will be considerably lower than otherwise, taking into account the spread between Euronotes or commercial paper and bank production loans. In effect, we have tapped markets on a limited recourse basis which have heretofore been reserved for only the world's most creditworthy entities. In the future, the multi-market credit facility could be used to gain access to export credits, fixed-rate private placements or perhaps even public offerings.

Current Assignments

First Boston's Project Finance Group is currently working on some 40 assignments. Let me highlight two of them which have direct relevance to my paper.

1. By 1986, in a remote corner of Western Australia, the Argyle Diamond Mine will begin producing some 25 million carats per year. This will be the world's most prolific diamond mine by far, producing about a quarter of world production. Fortunately, the quality of diamonds is low enough so as to increase the value of world supply by only 4-5 percent. We are advising the majority sponsor in that joint venture, CRA, in a project whose commodity is by and large unfamiliar to lenders, in sharp contrast to coal, oil, gas, etc. We have spent over a year with our client preparing the intense educational process of getting lenders comfortable with a cartel-controlled commodity. Given OPEC's state, our job may not be easy.

2. General Electric recently announced the sale, for $2.4 billion, of its Utah International subsidiary to BHP, Australia's largest industrial corporation. First Boston has

been retained by BHP to advise on raising non-recourse debt to support a portion of its acquisition. This is an interesting example of the use of non-recourse project financing to finance the acquisition of assets.

Concluding Remarks

I would like to conclude by summarizing some of the characteristics of the limited recourse financings we have arranged.

i They have been by and large for development projects. Of course, the BHP/Utah financing will be for an already-producing property.
ii Some have been without completion guarantees, but these are the exceptions - either exceptional project economics or exceptionally strong sponsors with a proven history which demonstrates the ability to bring in a project on time and on budget.
iii The projects have included industrial, transportation and mining entities, not just energy projects.
iv Debt repayment flexibility has been the norm. Lenders appreciate the fact that a project could be economically viable despite some cyclical downturns. Therefore, repayment is often linked to cash flow.
v We have arranged non-recourse and subordinated export credits for projects.
vi Many projects have had small participants with only limited access to credit.
vii Most of the projects were supported by 'commercial' sales contracts, not firm 'take-or-pay' contracts.
viii We have arranged non-recourse commercial paper and Euronotes.

While no one can state with any degree of certainty what events will come to pass in a project, it never fails that years later, when even minor things go wrong, people are forced to react and ponder what would have occurred had people acted earlier to prevent such a situation. If there was ever a way to take such action in the area of finance, then limited recourse financing is such a mechanism. It is the insurance policy against some of the remote and not-so-remote events which we are unable to predict but which will inevitably occur.

How the Canadian mining industry perceives and moves to take advantage of the factors outlined above could determine how it will adjust and perform in an increasingly unstable and competitive market for capital. The old lines have blurred, and the easy compartmentalizing of responsibility for funds is going, if not gone. Not all corporations are going to make the transition to the brave new world. But the rewards for those that do could be impressive.

PART III THE FUTURE

THE WIDER PERSPECTIVE

Alfred Powis

The focus of this study is on financing for survival - in effect, how does the mining industry stay solvent in the short term and, in the longer term, how do we finance new projects? In this paper, the emphasis will be on the longer term aspects of the problem and the future of the industry, using the present situation as a starting point. In the process, it will be suggested that perhaps we are asking ourselves the wrong questions.

It is no secret to anyone here that we are living through the most dismal set of economic conditions since the early 1930s, and for some industries the worst ever. It is worth noting, however, that the impact of this has been very uneven. High technology companies like Mitel and Northern Telecom, for example, hardly notice it, while primary industry - the so-called smokestack industries - has been devastated. As just one illustration, the operating rate in the U.S. steel industry in late 1982 was around 35 percent of capacity, as bad as in the worst days of the 1930s.

For Canada, this has meant that what we so blithely assumed short years ago would allow us to inherit the world - our strength in natural resources - has recently been our Achilles heel. The fact that our economy is so heavily geared to natural resources has meant that this depression has hit us much harder than our trading partners. The natural resources business hasn't been much fun lately, but I do sleep like a baby - which is to say I wake up every two hours crying.

What we are living through is a tragedy with a profound human cost, in terms of shattered dreams and genuine hardship. In past recessions, businesses were pushed to the wall and went under, but generally they were the marginal producers that did not deserve to survive. Today's conditions are bringing down businesses and people who do not deserve it, at terrible cost not only to those involved but also to the economy as a whole. And unless things get better soon, the damage to the economic fibre of this country will be difficult to repair.

What this is producing is a depression of the spirit and a profound change in attitudes which will probably last for the rest of our lifetimes. Simply stated, people are frightened, whether they are a miner in Northern Ontario or a bank chairman at the corner of King and Bay - and there is nothing worse to deal with than a nervous banker. The memory of what has happened will not be quickly erased, and future patterns of behaviour will likely be radically different, a premise that has real implications for the problem we are addressing.

Canadians have done a number of stupid things, and we have made matters much worse than they needed to be. Having said this, however, had we done everything right we would still be in deep trouble. The problem is worldwide, and with the sort of economy we have and the sort of industry we are in, there is no way we can be insulated from it. The question is, what has happened? Why is this recession so much worse than anything we have known before?

The Kondratieff Cycle

In this regard, I have become a recent and rather hesitant convert to the theory developed in the 1920s by a Russian economist named Kondratieff, who postulated that democratic capitalist economies go from peak to peak, or trough to trough, over a 50 to 60 year cycle. The workings of this cycle, which is institutional and behavioural in nature, can be masked by shorter 7 to 10 year investment cycles and 2 to 3 year consumer cycles. But if all these cycles hit bottom together, you get another 1932. A bit of mental arithmetic may suggest that we are now more than 50 years past 1932, and so things should now start to improve. Perhaps so, but the rest of the 1930s was not much fun either.

The rationale for Kondratieff waves is that prolonged prosperity contains the seeds of its own destruction, as the good things in life are pushed too far. Wealth becomes something to be redistributed rather than being used to create even more wealth. Old-fashioned values such as discipline, hard work, thrift and family become unfashionable. Institutions become stagnant, productivity declines, inflation takes hold, innovation and investment are stifled, speculation runs rampant, and both corporations and individuals become financially imprudent. Faced with this overload, the system begins to decay and eventually collapses.

Empirically, this sounds a great deal like what has been going on over the past 15 years, which is one reason why I have become a reluctant convert to the long wave theory. In effect, the length of the cycle is related to the working lifetimes of individuals and the vividness of their memories of past economic disasters. In other words, those who refuse to learn from history are condemned to repeat it.

Recovery from a long wave collapse to a period of stability and growth is driven primarily by forces beyond government control - innovation, debt liquidation, changed social and political attitudes, the work ethic and entrepreneurial effort. Private sector survivors, of economic necessity, correct the excesses of the previous period through enhanced productivity and financial restructuring. Individuals, having had the wits scared out of them, approach both working habits and expectations from society with much more realism. Slowly and painfully, the excesses are wrung out of the system and the stage is set for renewed growth and prosperity.

This long wave theory is highly controversial, in part because it implies that governments can do little to extract us from the crisis - a bit like having to let a bad fever run its course. To the extent that the theory has validity, the best thing they can do is to try not to make things even worse, to make the patient as comfortable as possible and to create the best possible environment for stimulating the productivity and innovation that will produce lasting recovery. The problem is long term in nature and has its own timetable which (given the interaction of political, social, economic and financial pressures) is difficult to interfere with.

The lesson from history, however, is that most governments will do the wrong thing. They have accepted responsibility for the economic welfare of the public, and political survival demands that they be seen to be doing something about the problem. Because the crisis casts doubt on the effectiveness of institutions that provided the previous prosperity, governments are tempted to replace them, take them over or otherwise control them. The danger now is a big push in the direction of state capitalism, entailing further erosion of the market sytem, increased loss of efficiency, renewed inflation and reduced living standards. Above all, it entails loss of freedom. I will return to this theme later.

It would be wrong to draw the analogy with the 1930s too far. Today, safety nets are in place which substantially mitigate individual hardship. Moreover, in the 1930s the situation was pushed to total disaster by collapse of the banking system. Looking at such problems as Poland and Mexico, Dome and International Harvester, there is no guarantee that it will not happen again, but it seems unlikely. We may not yet know how to achieve stable growth, but we do seem to have learned how to prevent financial collapse. However, we will have to learn to live with a banking system which, like the rest of us, has undergone a profound change of attitude, and this has important implications in terms of the subject matter of this study.

Accepting the long wave theory as a working hypothesis, it has profound implications for the mining industry. History teaches us that economic crisis has always produced profound structural and institutional change. What we seem to be facing in this decade is slower real growth, interrupted by deeper recessions, and a high real cost of money. We will have to contend with continuing, albeit reduced, inflation, interventionist government tendencies and unstable markets. International competition within the mining industry will be vicious, exacerbated by government subsidies - overt and hidden - and by competitive currency devaluations and protectionism. Only companies that are cost-effective will survive, and marginal operations will be a luxury we can no longer afford. Finally, debt leverage at levels customary in the recent past will no longer be acceptable or prudent.

It should be noted at this point that the Canadian mining industry has coped with the present economic environment remarkably well. It has, after all, survived - unlike the U.S. industry which is now largely an unwanted appendage of the major oil companies. Employees and shareholders have suffered real hardships, but the task of improving competitiveness and financial restructuring is being vigorously and effectively addressed. We have a real chance of emerging from this period as the major private sector force in the world's mining industry provided we are left alone to do our own thing.

Redefining the Problem

This finally brings me to the subject matter of this study - financing for survival and for longer-term growth. In this regard, I advance two basic premises:

i For the time being at least, there appears to be adequate capital - and the right kind of capital - to finance the industry's survival;

ii In terms of new projects, the problem is not one of lack of capital or even of the right kind of capital; rather, the problem is a lack of viable new projects.

In formulating the terms of reference for this study, it has been suggested that there is a serious structural or secular problem inherent in the shift away from equity and long-term bond finance to bank finance, which is relatively short term, high cost and at floating rates. I would like to suggest that this is yesterday's problem and that, while we are still living with its aftermath, anyone who is planning to lean on the banks for survival or project financing is likely to come up dry. As stated earlier, bankers have undergone a profound change in attitude, like the rest of us. They are now extremely risk averse, and the free-wheeling lending practices of the 1970s are a thing of the past - probably for the rest of our working lifetimes.

Let us look at my first premise: the adequate supply of capital. The evidence suggests that there is in Canada (for the moment at least) an abundant source of survival capital available in the form of common equity. Companies in the mining industry that have tapped, or are about to tap, this market in a major way include Noranda, Inco (three times), Falconbridge, Placer, Teck, Sherritt Gordon and Westmin. The total of new equity in the industry will be well over $1 billion, and there are few if any other countries where a mining industry could have achieved equity financing on anything like this scale. In terms of shareholder dilution, this sort of financing is somewhat painful, particularly if it has to be done at distress prices, but it is available if needed.

Now let us turn to the issue of viable new projects. For many commodities the world presently has in place ample capacity to supply probable demand for much of the 1980s, and in these circumstances new projects are difficult to justify. For example, given what inflation has done to capital costs together with foreseeable market conditions, few people would be foolhardy enough to embark on development of the type of low grade open pit copper deposits that gave such impetus to the industry in the 1960s, even if financing were readily available. There is simply no sense in trying to force-feed new projects to supply a market that does not need the product, and those who try will be appropriately punished by the iron laws of economics.

The real villain, of course, has been inflation which has pushed the capital costs of new projects to levels that are multiples of what they would have cost 15 years ago. Coupled with a high real cost of money and price levels that have not kept pace, most major new projects today simply cannot service the debt and pay their operating costs. Moreover, for major projects, capital costs have escalated to levels that are beyond the financial capacity of individual companies.

It seems to me that it is idle to talk about innovative financing methods somehow permitting such projects to be embarked upon. It is all very well to talk about shifting the risk on to someone else, but he who takes the risks also deserves the rewards. And to talk about shifting risks to banks is simply not on, in any foreseeable time frame, for the reasons referred to earlier. As the banks have discovered to their horror, they have already assumed a great deal more risk than they bargained for, and in any case they are not in business to risk their depositors' money.

The real risk capital in our system is equity capital. By its nature, it has no fixed cost or repayment date, and is only entitled to a return if and when profits are earned. It seems to me that this has to be a major source of capital for new resource projects, and as indicated earlier there is plenty of it around at present. If a company cannot supply such capital from internally generated funds, and if it is unwilling to go to the market for it to finance a new project, then perhaps it should rethink the desirability of the project.

For the time being, and in a manner reminiscent of the 1930s, precious metals seem to be the only game in town. However, recent history suggests that the industry, though battered and weakened, is still alive and functioning. Having been driven out of Ontario, Canada's irrepressible mining promoters moved to Vancouver and continued to appeal to our gambling instincts. As has so often happened in the past, they took this gambling money and came up with a major new gold discovery at Hemlo, north of Lake Superior. Following this, major companies competed vigorously for the right to develop the properties.

The point here is that, despite the industry's weakened condition, there is plenty of money available for new projects that are clearly viable. In the case of Noranda's involvement at Hemlo, we competed aggressively and successfully for the right to develop one of the deposits even though our financial condition is weaker than we would like it to be and we are operating with rigid controls on spending of all kinds. We did this with confidence that, if the deposit was as good as we thought, a way could be found to finance the development even if our overall circumstances did not improve - for example, with project financing or, as a last resort, through an issue of equity.

On the other hand, projects that appear marginal, based on the commodity price history of recent years, are clearly difficult to finance or justify, and perhaps that is just as well, if we are entering a period where we can no longer count on inflation to paper over our mistakes. If my suspicions or fears about the 1980s prove correct, relatively high cost producers are in for a very rough ride, and perhaps the markets are doing us a favour by keeping us away from such projects for the time being.

Governments' Limited Role

This is not to imply that everything is fine and there is nothing governments can do to improve the industry's ability to raise capital. For example:

i We need a stable and more attractive tax regime. The tax wars of the mid-1970s did enormous damage to the industry and the effects are still with us. The relative quiet of recent years has been welcome, but the overall burden in many jurisdictions is still too high.

ii We need to stop poisoning the environment for foreign capital. There are enormous pools of capital around the world that would be anxious to invest in Canada if they felt they were welcome - a feeling they certainly do not have at present.

iii If we want new mines in this country, why not put in an incentive that has clearly demonstrated its effectiveness in the past - a three-year tax free period?

iv In many cases, new developments could be facilitated considerably if financial institutions were again allowed tax-exempt financing through the mechanism of income debentures and term preferred shares.

v A real force in this country could be unleashed if governments would stop trying to protect Canadians from themselves and loosen the strangling burden of regulation of junior mining companies.

vi Given that the real need is equity capital, governments should attempt to channel the savings of Canadians to this area through incentives. In particular, they should rethink the desirability of capital gains taxation.

Above all, however, I would plead for governments to establish a reasonable overall environment for the industry to operate in and then leave us alone to do the job of managing for short-term survival and long-term growth. The private sector in Canada has done a remarkable job of developing this industry in the past and of surviving the present depression without government help. And I would remind you of the world's three most common lies: my cheque is in the mail; of course, darling, I'll respect you in the morning; and I'm from the government and I'm here to help you.

The Heilbronner Thesis

In this regard, however, a recent article concerning the role of the government by the economist, Robert L. Heilbronner, entitled 'Does Capitalism Have a Future?' is significant not so much for what it says as for the serious attention it has apparently received in certain circles in Ottawa. Heilbronner's thesis is that capitalism is a system that cannot stand still. Its focus is that incessant and insatiable drive to accumulate wealth and to use the capital created by the system to build more capital. However, he concludes that, in complex ways, the mixed economy and the welfare state, mighty engines of growth in the 1950s, became mighty engines of inflation 20 years later, seriously damaging the ability of the system to generate capital.

At the same time, he states that it is futile to think of social evolution as permitting a return to the simpler ways of the past. With all their difficulties and inefficiencies, government activities will remain and grow because they still provide the necessary underpinning and essential economic security required for a workable capitalism. Arising from this, he concludes, will be an effort to restructure things in three ways that will once again encourage capital accumulation.

i It will be essential to deal with the chronic ailment of the present structure - inflation - which can only be done with the introduction of various kinds of ceilings and restraints; price and wage and dividend restraints involving an administrative structure as pervasive in U.S. economic life as that of the Internal Revenue Service.

ii There will be a marked lessening in the distinction we now make between the private and public sectors, with the state corporation becoming the vehicle of the future. This will arise because it is the only possible means of amassing the finance, exerting the political pressure and supplying the entrepreneurial zeal needed to survive in the new arena of global competition.

iii There will be an end to the liberal trading system that has served the post-war world so well - a wrenching abandonment of the idea of a unified world market as the global basis for accumulation and its replacement with a system of regional blocs, each securing a protected market for its favoured producers and regulating its intercourse with other large blocs.

Heilbronner expects that this transformation will last more than a decade, an extended period during which we can expect all the unease and dissension characteristic of times that have not discovered a consensus, or concluded a viable social contract, or forged a viable social structure of accumulation. Nor does he expect the change to be welcomed, however inevitable it may be.

Now this may sound as chilling to you as it does to me. For one thing, the state capitalism described was called fascism when I first studied economics many years ago. The implications in terms of efficiency, living standards and above all freedom are staggering. And yet, it is merely one plausible extrapolation of present trends. Just look at PetroCan or Dome, 6 and 5, Japanese car quotas, and the rash of U.S. protectionist legislation. And the rumblings from Ottawa are that there are plans afoot to build Eldorado into the PetroCan of the mining industry, which is the sort of help we really do not need or want.

It doesn't have to turn out that way, but we'd better accept the fact that we don't live in a static world. In particular, history teaches us that economic crisis has always produced profound change, and that societies that fail to adapt adequately to the challenge can continue to slide for very long periods. There are a number of possible outcomes to our present situation, but the future is up for grabs. The ancient Chinese had a curse - 'may you live in interesting times' - and this seems to be our fate.

In the turbulent times that seem to lie ahead of us, let us not lose sight of the fact that capitalism is not an ideological abstraction - it is what has produced a world of unprecedented prosperity and freedom for those who have embraced it. As we grope for our future course, it would be well to bear in mind the words of the noted historian, Paul Johnson: 'Those who wish to maintain the capitalist system must endeavour to teach the world a little history, and remind it, and especially the young, that though man's achievements are great they are never as solid as they look. If man makes the wrong choice, there is always another Dark Age waiting for him round the corner of time.'

THE IMPACT OF REGULATORY FRAMEWORKS

Brenton J. Bradly

This paper focuses on the Canadian mining industry and its relevant regulatory framework. At the same time, however, it also refers in certain instances to the experiences of other countries which may be pertinent and can be drawn upon to Canadian advantage.

The comments are organized in three parts. One could say that this arrangement has something in common with three quarters of a Vivaldi concerto. The first part covers a winter of hard news or, rather, six industry problems. This is followed by a spring of mixed news, with April showers and sunny interludes; this section discusses regulatory constraints and opportunities for regulatory enhancement. The third part provides a contrast, with a summer of good news about novel mine financing developments. Unfortunately, since we're in a very northern climate, the summer movement is relatively short!

Winter

The mining industry has experienced an almost unprecedented period of recessionary end markets. The bottom was reached in either the second or third quarter of 1982, when many mines which had stalwartly continued to operate below their breakeven point finally had to close. True, a few major projects did get underway, and with significant external financing. Quintette and Bullmoose are significant examples on the coal side. But these projects had been in the works for years and were, in addition, uniquely supported by export contracts plus the equity risk money of the coal buyers. Their financing was effectively underwritten two years in advance by a few banks backing the project sponsors. Even so, other bank participation was not really widespread and a number of major project banks declined to play. I think it unlikely that more buyer finance will be seen in the same form and magnitude for a long time to come.

Second, it is probable that the current recession in mineral production is not just part of this business cycle. The industry slump is much more structural this time, and therefore more permanent. Financiers can see that many, though not all, mines have lost management, have lost employees, have lost service industry backup, and have exhausted their necessary capital bases. These mines or mining companies won't be properly in place to take advantage of any turnaround in the commodity and capital markets. Financiers are also concerned about structural changes in the end markets. Just for example, will fibre optics substitute for copper sooner and more significantly than was thought? Will Japanese steel, or any steel for that matter, require previously projected coal quantities? Or more importantly for some producers, will they require the expected coal qualities? Other end-use downside possibilities abound.

This leads to a third problem area. Most certainly, there is an excess of competitive supply outside of Canada today. Almost certainly, the excess will continue for years to come, perhaps regardless of the next business cycle upturn. Some of the competition is subsidized by government-related entities in exchange-hungry countries. In other cases, mines are owned by major international corporations who took on mining as part of their diversification efforts. In some such instances, personal pride or 'corporate long-term strategy' will dictate that production continue at uneconomic levels. It is ironic that corporate diversification took place at the same time as buyer diversification. In the latter case, Japan and others deliberately sought out alternative sources of mineral supply. Admittedly Canadian sales benefit from these recent buyer efforts in the short-run. But in the long run, Canadian mines will be exposed to competition from an increased number of foreign suppliers, many of whom are subsidized.

Fourth on my list of six problems: Canada is not, in most individual mine cases, a low cost producer. Peter Glenshaw's paper draws attention to this issue. And, as Albert Dorland's paper shows, the mining industry was made up of 3,303 companies; there are already fewer, since that report was prepared! Most of these have just one mine or a specialized service. This situation refutes the potential for economies of scale in production, management or finance.

Canadian labour costs are high and mine labour seems, at least to many observers, to be relatively immobile. Perhaps the welfare system or perhaps intercompany pension transfer problems contribute to this immobility. I do not propose, however, to include this delicate topic in my discussion of regulations. It is more the province of social scientists and politicians than that of a banker.

A fifth problem area relates to credit capacity in the

Canadian mining industry. It is in a terrible condition. Capital expenditures committed years ago continue on at high levels, but cash flow has all but evaporated. It actually went negative in the third quarter of 1982. The Statistics Canada numbers in Albert Dorland's paper indicate that net long-term debt in the industry actually declined between 1972 and 1980 from 24 percent to 18 percent. Equity was reported to have increased from 58 percent to 64 percent. This picture is very surprising to me. As bankers, we constantly see balance sheets with ever-increasing debt loads and increasingly suspect assets in terms of their future earning power. To clarify the apparent contradiction, Morgan's Financial Analysis Department has drawn up a 5-year statistical comparison (see appendix). The resulting story is one that lenders recognize. The ratio of total borrowed funds to net worth increased from 27 percent to 79 percent. Return on net worth declined from 20 percent in 1979 to minus 2 percent in 1982 (see below).

Even if commodity prices do turn sweet, many mines and companies will be struggling just to get themselves back to Go. Some of them may not get that far and, as a result, may never weather the following inevitable downturn. Of course, their position will not be aided if they have to pay taxes in the meantime.

Before leaving the subject of producer credit, at least we can say the mining industry did not get caught up in the the NEP-inspired, bank-supported takeover bandwagon. That has led to some amazing ratios in the oil industry. For example, the 1982 Sulpetro report shows a debt-to-equity ratio of 34:1. The debt, which amounts to over $600 million, was borrowed from just one bank less than two years ago.

I now come to my final category of problems facing the Canadian mining industry. That is, many of the traditional lenders are in something of a fix themselves. Most are backing off from the highly aggressive postures which were the general rule until very recently. In Canada, bank exposures to individual borrowers or so called 'borrower groups' have come under scrutiny from the Inspector General of Banks as well as bank senior managements. Some banks are announcing new internal limits as low as 10 percent of capital. In contrast, some existing client loan exposures are almost as great as the capital of the same banks. The foreign bank subsidiaries in Canada are subject to regulation too, but I will return to this subject in a moment.

Lastly, non-bank long-term lenders have always been in the mining business, but access to them is usually restricted either to the bigger, more diversified, capital-strong companies or to the exceptional projects with assured markets.

Spring

And now we come to spring in my economic concerto. Superimposed on the sad litany of contemporary problems facing the mine industry is a regulatory framework. It has some positive aspects. The Export Development Corporation is one example. But unfortunately, the framework in many respects compounds the impact of adverse circumstances which are outside the control of the industry.

At the top of my list is the subject of government take: take of all kinds, whether federal taxes, provincial taxes, provincial royalties, or whatever. The contention can be made that government take detracts too much from the ability of the mining industry to finance itself and invest in risks which, from a 'national benefit' point of view, should be invested in. Having said that, dare one say more about the incredibly complex issue of 'national benefit', and how much it would be affected by concession X or concession Y government take from to mining?

Actually, I don't think that this kind of academic and/or quasi-political approach is necessary. The alternative approach is simply for Canada to examine and assess what other governments have done or are doing in the mining field. If this examination shows that Canadian 'take policies' are not competitive, then the Canadian mining industry is, by definition, competitively handicapped by its own government.

The examination would show up a whole variety of arrangements in place in other jurisdictions. Examples include: guaranteed investment recapture arrangements; a specially reduced tax on so-called marginal projects; and permanently reduced tax levels on qualifying minerals investments. Elsewhere, taxes are deferred until project risk loans are paid down. Peter Glenshaw mentions above the total tax holidays afforded to gold mines in Australia. In the USA, tax shelter transfers are huge. An examination of these and any number of comparable subsidies or tax holidays make it clear that:

i Canada's mining regulations should be at least as encouraging as those of its principal international competitors;

ii the government take, which is not at risk, should come after the business of investors and lenders, who are at risk.

Second on my list of spring showers is the suggestion that the existing corporate tax system builds in discrimination against otherwise worthwhile mining projects. This is because tax payers and non-payers view the economics of new capital investment quite differently. The seriousness of the problem was highlighted in 1982, for example, as the non-tax-paying Alsands partners folded their tents and crept away. To counter this kind of problem, the National Energy Program introduced the Petroleum Incentives Program (PIP) incentives system, and eliminated previous depletion allowances, which had rewarded only those profitable companies paying taxes. People could debate endlessly, and have debated endlessly, on the merits of the PIP schemes as regards its ownership and geographic orientations. Nevertheless, incentive payment schemes rather than tax allowances would favour most players in the mining industry today.

Outside of Canada, a whole range of investment-enhancing, tax-sheltering schemes have been inspired in the past few years, either by the recession or by new government policies. The biggest by far in dollar terms has been the recent tax trading arrangements in the USA. Non-taxpayers have been able to sell tens of billions of dollars worth of so called 'tax titles' to totally unrelated third party taxpayers. Naturally, the U.S. mining companies have not been slow in peddling tax titles to their new capital equipment, reducing its cost to them by about 30 percent in present value terms. And that is competition!

My third regulatory topic relates to foreign equity. The first premise is that mining is indeed an international industry. The corollary premise is that the industry can best prosper in Canada if it can draw on experienced foreign risk money, whether it be in the form of equity or debt. Only then can Canada compete internationally. The foreign equity problem is best illustrated by the PIP/COR (Canadian Ownership Rate) and FIRA regulations. PIP and COR may not seem to apply to mining, strictly speaking, but indirectly they definitely do. First, they set a deterring precedent in the minds of many politically sensitive investors. Second, companies that are in both mining and oil activities have to watch their COR oil ratings even if their ratings are not supposed to affect their mining operations. This definitely reduces the appeal of their stocks to foreign equity investors. It also deters lenders, since a company's COR rating, and therefore credit standing, may be hard to control and impossible to predict.

Now to FIRA. Here it is debt money as well as equity money that is worried. I would like to provide an example to illustrate the point. Our bank many years ago extended credit to a Canadian mine which was controlled by a foreign company. A few years ago that company was taken over in its home domicile. The takeover was motivated by considerations which had little to do with the Canadian operations. Anyway, as a result, the Canadian subsidiary was technically persona non grata in Canada. What about the status of our loan? Technically it too was a 'loans' non grata. Yet that financing helped employ hundreds of mine workers in a depressed area. Eventually a resolution worked its way through FIRA. Meanwhile, however, it was an embarrassing and worrying episode for many people in and outside of the company. The investment of minority shareholders, if there had been any, could have been wiped out during the period of uncertainty. In summary, PIP, COR and FIRA are detrimental to Canadian mine finance on the equity side.

The tale of the foreign company leads me to the subject of foreign lending, my fourth regulatory topic. I have touched on the lending limits placed on the foreign banks operating in Canada. Typically, their loans are restricted to 50 percent of their local capital which in turn is kept down by regulatory constraint. By law, the 55 foreign banks in Canada are restricted to only 8 percent of the total bank market. Five Canadian banks have something like 85 percent of the remainder. The 50 percent of capital loan rule is applied to foreign bank subsidiaries, even though their parents may have more assets and capital than the biggest Canadian bank. Of course these banks can lend into Canada from outside, but frequently withholding taxes limit such financing to terms in excess of 5 years or to currencies other than Canadian dollars. This is not helpful to Canadian mines.

In her article above, the Minister of State for Mines suggested that it was the role of small foreign banks to support the small mines, or to combine in syndicates to so finance other Canadian mines. I think this is really wishful thinking; if there are good small mines, they can be readily financed by the big Canadian banks. Conversely, foreign banks will not be interested in small mines just because their loan limits are minimized by the law.

An additional lending concern relates to the position of foreign banks taking legal title to Canadian assets, especially in the form of corporate shares. It would be helpful if policies could be further clarified with respect to foreign bank secured lending.

In Canada, incidentally, foreign lenders to the oil industry are additionally affected by further worries about COR, especially in the Canada Lands. By taking secured title in the normal way, lenders may well violate the minimum COR conditions for PIP grants and for subsequent approval of oil field development. There is still a complete absence of detailed regulations on this topic under the Canada Oil and Gas Act. I should emphasize that the absence of detailed secured lending regulations in the Canada Lands affects oil and mining financing equally. Our bank is working with Canadian counsel and with the government on the important issue of security in the Canada Lands.

Sixth, relatively little has been said about mineral price and/or income stabilization. Many countries have experimented successfully with price stabilization boards for various industries. Government support is frequently required. Usually these schemes only work for homogeneous commodities being sold through a single intermediary; it is difficult to imagine how it could work in Canada's highly fragmented minerals industry.

However, a similar impact could be achieved if the tax environment gave more recognition to the long-term cyclicality of the minerals industry. This could be achieved rather simply, by introducing longer-term tax carry-backs and carry-forwards. Under current Canadian practice, losses can be carried back against the one previous year's profits, or carried forward five years. In the U.K. there is also a 1-year carry-back, but an indefinite carry-forward period. Under U.S. federal law there is now a 3-year carry-back and a 7-year carry-forward. Some U.S. state laws are even more favourable. Once more, these jurisdictions give their mining industries what is, in effect, a competitive advantage over Canada. Moreover, the current tax jurisdiction in Canada discriminates against those very mining companies which most deserve to succeed. Imagine, for example, a new first-class mining company which prudently, or luckily, brings its only mine into production in one of the high price periods, say 1980. It subsequently loses money in the down cycle in 1982. This company cannot claim back the taxes paid on 1980 income. Contrast this company with a second-class competitor who had losses for five years prior to 1980 and, therefore, was able to avoid any taxes on its profits in that year. Canada already has the necessary taxation mechanics in place. A change in the carry-back and carry-forward periods, or in the tax averaging arrangements, would more properly recognize the long-term cyclicality of the industry (this change has since been introduced in Canada as announced in the April 1983 budget - editor).

Finally, on regulatory issues, I would say simply that nothing deters the supply of finance more than uncertainty about the direction of future government policies. When lenders perceive retroactive back-ins by government in the oil sector, for example, they naturally see these as possible precedents for mining. There is no need for me to dwell on this point, but it is perhaps one of the most important and serious issues to mention. Is it possible that a basic long-term mineral policy could be agreed upon between the political parties? If government rules are clearly enunciated, and are presented as long-term measures rather than short-term stop-gaps, reassured money will be provided more easily and in quantity. Let me illustrate with a foreign example. In the heady days of North Sea oil, the U.K. Labour government indicated that its primary concern was a too-rapid depletion of the next generation's oil resources. Fears of official prorationing and shut-ins suddenly slowed the supply of risk loan money to a mere trickle. At this point, Mr. Varley, Minister of Energy, advised the House of Commons that early fields would not be prorationed under any circumstances for a defined number of years. The 'Varley Statement', as it came to be known, became essential to every project financing in the U.K. North Sea for many years. Government policy had been pronounced and it was strictly adhered to.

Summer

Now a brief composition for summer concludes my remarks. I would like to mention just a few non-regulatory topics, which are of keen interest to many of our mining clients today.

First, in the past year there has been a phenomenal growth in long-term interest rate and currency swaps. For mining companies, these swaps have made it possible for them to convert floating rate bank debt into fixed rate term debt out to ten years or longer.

Another new financing technique of specific interest to the gold mining companies is gold borrowing. A relatively few major institutions, such as Morgan, are lent gold at extremely low rates by parties whose long-term gold investments would otherwise earn no return except when sold. This gold is then loaned by the institutions to producers, also at very low rates. The producers can sell the gold for needed cash and then repay the gold debt in kind from future production.

The so-called off-balance-sheet financing is always re-emerging in new forms and guises. The recessionary times give a special impetus to innovation. The forward sale of future mineral production for immediate cash, for example, enjoyed a vogue in 1982. Indeed, the biggest private financing in Canadian history, Topgas Holdings, employed this technique in the amount of $2.3 billion.

Mineral inventory sales to financiers with remarketing contracts can help short-run profits and improve the balance sheet immediately. Similarly, receivable sales have been in vogue ever since the Lombards started banking. If the receivables are of good quality, mining companies can obtain lower-cost financing than their own balance sheets might justify.

Then we have liability assumption and debt defeasance techniques, which are still the province of relatively few financing experts. Their basic objective is to remove unwanted currency exposures or debt categories from the balance sheet, especially debt categories that cannot be readily prepaid.

A last comment on the subject of financing innovation. Why do Canadian mining companies always have to borrow secured? And usually from just one bank? At Morgan we believe that such security lending is frequently inconvenient and unnecessary. As we see it, negative pledges could be the maximum requirement in most cases, supported by covenants governing income and cash flow performance.

I would now like to conclude by re-emphasizing my two principal contentions. First, taxes, incentive schemes and other regulatory arrangements affecting mining in Canada are not competitive with those in other countries. Second, the regulations and guidelines in Canada have the effect of deterring the supply of large-scale, sophisticated equity and debt finance from abroad. Positive government support in these two areas would help maintain Canada at the forefront of the world mining industry.

Appendix METAL MINING STATISTICS - 1978-82 ($ Cdn. millions)

	1978	1979	1980	1981	1982
Total Assets	13,482	16,180	18,725	21,937	23,384
Debt: Short term to banks	229	334	355	669	532
Long term to Cdn. banks	475	501	960	1,473	3,317
Long term to other banks	613	697	617	938	1,012
Bonds	1,221	1,021	1,021	1,429	1,[illegible]
Other (incl. mtges. & loans from affiliates)	914	876	1,235	1,911	1,158
Total borrowed funds (TBF)	3,452	3,512	4,187	6,421	7,815
Net worth (NW)	7,291	8,972	10,141	11,299	11,235
Sales	6,290	8,695	9,955	8,920	7,471
Net income	761	1,811	1,897	719	(268)
Capital expenditures	620	1,077	1,870	2,021	1,848
Interest expense	268	280	373	572	692
Ratios: TBF/NW	.47	.39	.41	.57	.70
Return on net worth	10.4%	20.2%	18.7%	6.4%	(2.1%)

Source: Statistics Canada: CANSIM Computer Database.
Note: Companies over $10 million assets only.

FINANCING THE FUTURE

Ralph G.M. Sultan

Previous papers have documented the present financial condition of the Canadian mining industry. Such phrases as 'crisis' and 'survival' have been used. The unvarnished truth is that today, in the spring of 1983, the Canadian mining industry, for all its marvellous geological and engineering prowess, is a financial cripple which does not well serve those who have invested in it, those who have lent money to it, nor even governments who rightfully expect a more adequate tax return from it.

The world recession deserves much of the current blame. But our problems are more than cyclical, and I would nominate three other culprits: overly eager - if not outright gullible - investors and lenders; indifferent government policy makers; and industry financial managers who, by building debt on debt, have constructed accident-prone balance sheets.

At the risk of presenting yet another version of facts already presented by others at this conference, let us begin by reviewing trends in capital structure of the Canadian mining industry.

These statistics run parallel to those given to you by Peter Gillin, Brenton Bradly, and others, and will lead to identical conclusions: namely, that for many years there has been a growing use of debt in the Canadian mining industry, that credit quality has declined; and that there is now a need - and an opportunity - to increase the equity component of mining company balance sheets.

In what condition do we find the Canadian mining industry balance sheet? Data are compiled regularly by investment dealers Gardiner Watson (see table 1), who employ a broad definition of the industry, as viewed by the equity market investor: some $27 billion in assets (excluding gold mining companies).

It is obvious from their data that mining industry balance sheet leverage has been climbing steadily from 1969 to 1982. Over this 13-year period, the proportion of equity on the balance sheet declined from about 75 percent to about 50 percent. If we accept the rough premise that what isn't equity must therefore be some kind of debt, then these data suggest that the industry 'debt'-equity ratio increased from .33 to about 1.0 today.

TABLE 1

PROFITABILITY OF CANADIAN METALS AND MINERALS CORPORATIONS,[a] 1970-83
(excluding gold mining companies)

Year	Equity as % of total Liabilities	Return on % on Assets before tax and before interest expense	% Return on Equity (after tax)	% Operating Income to Assets
1969	74.2	N/A	N/A	N/A
1970	71.8	13.28	12.75	16.87
1971	64.4	7.32	7.37	10.98
1972	61.8	8.35	8.70	12.33
1973	68.3	16.64	18.80	20.77
1974	68.0	19.51	19.09	23.66
1975	62.1	10.56	8.52	14.86
1976	60.3	9.85	8.34	13.97
1977	58.3	9.93	8.85	13.92
1978	61.2	12.68	12.41	16.33
1979	68.2	20.99	23.71	24.51
1980	68.3	18.94	20.49	22.60
1981	57.6	8.56	7.21	12.33
1982	50.0	1.13	(4.80)	5.04
1983[b]	51.5	8.15	7.48	12.35
Average		11.69	11.36	15.76

Source: Bryan G. Smith, Gardiner Watson Limited, Investment Dealers, Toronto, Ontario

Base:
1982: Total Equity - $10.5 billion
Total Assets - 27.3 billion
Total Debt - 10.7 billion
Short, Long & Preferreds
1983 Forecast:
Total Equity - $10.99 billion
Total Assets - 26.5 billion
Total Debt - 10.63 billion
Short, Long & Preferreds

[a] Excluding gold mining companies.
[b] Forecast.
N/A: not available.

The word 'debt' is interpreted broadly here, even though not all of it is interest-bearing debt. A more precise definition would be 'non-equity'. It consists of bank loans, bonds, current trade liabilities, and ordinary preferred shares, as well as inter-company loans regardless of term or rate and, most significantly, zero-interest deferred taxes. All of this we call 'debt'.

What happened to profitability over this 1969-82 period? According to Gardiner Watson, return on assets, pre-tax and before interest expense, was highly cyclical and averaged 11.7 percent. The ratio of operating income to assets generally declined. Return on equity (after tax) was highly cyclical and averaged about 11.4 percent.

The industry's steady drift into higher and higher leverage is revealed by the statistics on interest rate coverage and debt repayability (see table 2). Interest coverage, about 25 times in 1970, was only 0.5 in 1982. In other words the industry covered only one-half its interest expense obligations from operating profits in 1982. In 1970, the industry could theoretically repay its total debt burden from cash flow in only 1.7 years; by 1982 it would have taken 25 years. Nor were analysts forecasting any return to normality in 1983; only modest improvement in ratios seemed to be indicated. Experience to date seems to support this view.

Official government statistics tend to paint the same picture (see table 3). According to Statistics Canada, between 1965 and 1980 the non-equity portion of total mining industry liabilities increased from 27 percent to 49 percent, a dramatic decline in financing by equity. This source also shows industry ROA (return on assets) ranging between 3 percent and 25 percent, with 1979 and 1980 being particularly good years. It appears that the industry averages about 9 percent ROA if these two more recent years are taken into account. Statistics on the post-1981 period have not yet been published.

The Statistics Canada definition of the mining industry is considerably narrower than that employed by analysts at Gardiner Watson: only $9.9 billion of assets, presumably with double counting of assets and liabilities eliminated from various holding company structures. It also looks at Canadian assets and liabilities only, excluding foreign operations of Canadian companies. However, it is precisely this pyramiding of debt and asset structures, as well as off-shore operations, which may have exaggerated the fragile state of the industry's balance sheet.

TABLE 2

INTEREST COVERAGE AND YEARS TO REPAY TOTAL DEBT: CANADIAN MINING FIRMS

Year	Coverage[a]	Years to Repay[b]
1970	25.0	1.7
1971	5.6	3.3
1972	5.1	3.3
1973	21.9	1.7
1974	10.6	1.5
1975	4.4	3.0
1976	4.6	3.7
1977	4.6	3.4
1978	6.5	2.7
1979	17.1	1.4
1980	10.9	1.6
1981	3.3	4.2
1982	0.5	25.0
1983[c]	2.5	4.7

Source: Gardiner Watson Ltd., Investment Dealers, Toronto, Bryan G. Smith.

[a] Operating profit before interest and rent payments, divided by total interest payments plus rent plus preferred dividends grossed up to pre-tax basis.

[b] Long-term debt plus short-term debt plus preferreds plus capitalized leases less cash; all divided by entire cash flow per annum.

[c] Forecast.

TABLE 3

'OTHER' MINING INDUSTRY:[a] CANADA 1965-80

Year	Equity as % of Total Liabilities	After Tax Profitability: % Return on Assets
1965	73.0	10.9
1966	75.1	12.7
1967	74.1	13.0
1968	72.0	11.7
1969	69.9	11.0
1970	64.3	10.4
1971	56.8	4.9
1972	54.8	3.3
1973	55.0	11.8
1974	54.5	10.3
1975	51.8	5.1
1976	48.7	4.4
1977	51.7	5.1
1978	52.2	7.6
1979	53.5	24.9
1980	51.3	18.4
Average		10.4

Source: Statistics Canada, Corporation Financial Statistics, annual.

Base:

Total assets 1980: $9.85 billion
Total equity 1980: $5.06 billion

[a] Metal mining, etc., excluding gold, iron mining, coal.

For contrast, it is illuminating to examine representative balance sheets of Canadian mining companies prior to World War II. We examined those of Inco, Consolidated Mining and Smelting, Hollinger, Dome Mines, Lakeshore, and Hudson Bay Mining over the 1921 to 1965 period (see table 4).

It seems that high leverage was pretty much a post-World War II invention. Between 1921 and 1945, the equity proportion on these particular companies' balance sheets was seldom below 80 percent. During the Hungry Thirties, the equity proportion was well over 90 percent,

TABLE 4

SELECTED CANADIAN MINING COMPANIES' CONSOLIDATED EARNING AND BALANCE SHEETS[a]

Year	Equity as % of Total Liabilities	After tax Profitability: % Return on Assets
1921	81.7	3.1
1925	73.8	20.9
1930	93.7	28.6
1935	91.5	26.6
1940	82.1	19.0
1945	79.4	16.2
1950	83.3	14.0
1955	84.4	9.3
1960	82.6	9.1
1965	81.5	5.4
Average		15.2

Base:	1921	1965
Total assets:	$123.8 million	$1.52 billion
Total equity:	$101.2 million	$1.24 billion

[a] Consolidated Mining and Smelting Co.
Dome Mines Ltd.
Hollinger Consolidated Gold Mines Ltd.
International Nickel Company
Lakeshore Mining Company
Hudson Bay Mining and Smelting Company

and profitability was high: in excess of 25 percent return on assets during the 1930s. Who says those were the bad old days? Certainly not the mine owners.

Leverage and profitability by size of firm

Perhaps this merely demonstrates that certain large Canadian mining companies did very well; that it is only when one dilutes the industry statistics with many dozens of struggling junior and intermediate mining companies that high leverage and low profitability become a concern. Not so. At least not in recent times.

The Economic Council of Canada has recently analyzed tax returns for mining companies both large and small, and concludes that it is the largest mining companies which carry the highest debt burdens (see table 5). For example, in 1977 about 46 percent of mining companies had a ratio of debt to total assets in excess of 77 percent. In contrast, only about one-third of those smaller companies with assets under $1 million fell into this 'high leverage' category. According to the Economic Council of Canada, the mining industry is unique among Canadian industries. In other Canadian industries leverage invariably works in the other direction: bigger companies have proportionately less debt. In the Canadian mining industry, in contrast, bigger companies have more debt. They had greater access to debt; they used it.

TABLE 5

MINING AND MINE PRODUCTS: 1977 BALANCE SHEET LEVERAGE BY SIZE OF FIRM[a]

Ratio of Debt to Total Assets (%)	Size of Firm ($ million)					
	Under .25	.25 to 1	1 to 5	5 to 10	10 to 25	Over 25
Under 33	32.6 (32.9)[b]	27.9 (25.5)	22.3 (26.5)	15.6 (36.7)	16.0 (44.5)	10.3 (43.4)
33 to 77	34.3 (37.5)	41.5 (49.4)	42.9 (52.0)	36.5 (42.7)	36.8 (43.5)	43.9 (46.6)
Over 77	33.0 (29.6)	30.6 (25.1)	34.8 (21.5)	47.9 (20.6)	47.2 (12.0)	45.8 (10.0)

Source: Andre Ryba, Economic Council of Canada, Financial Group.

[a] percent of firms in each size category with debt to total asset ratios as specified.

[b] Figures in parenthesis are comparable figures for all Canadian non-financial industry.

Were the bigger mining companies then generally more profitable? The answer is a mild 'yes', again according to the Economic Council - before interest and taxes are taken into account (see table 6). There seems little doubt, however, that after interest expense and taxes are taken into account (data not shown on this table), the larger mining companies in recent years have earned more on their invested capital than have the smaller companies.

TABLE 6

MINING AND MINE PRODUCTS: 1977 RATES OF RETURN BY SIZE OF FIRM[a]

	Size of Firm ($ million)					
Return[b] %	Under .25	.25 to 1	1 to 5	5 to 10	10 to 25	Over 25
Negative	47.7	31.8	26.8	27.5	22.1	15.6
0 to 20	30.0	48.8	53.6	55.1	52.8	60.4
Over 20	22.3	19.4	19.6	17.4	25.1	24.0

Source: Andre Ryba, Economic Council of Canada, Financial Group.

[a] Percent of firms in each size category earning specified rates of return.

[b] Profits before interest and taxes as percent of total assets.

To sum up: big mining companies borrowed lots of money, earned higher margins on their operations, and paid it out to the banks and other financial institutions. Interest expense put many companies into the red during 1981-82. Little mining companies didn't borrow as much - but a lot of them lost money too.

Long-term debt vs. profitability

At the risk of drawing some outrageous cause and effect conclusions, let's look at longer-term trends in debt versus profitability.

We have crudely charted the previous Gardiner Watson data linked to the sample of pre-World War II corporate data on leverage (figure 1). We have also plotted the long-term trend in profitability, as measured by return on assets, on a similar linkage basis (figure 2). There certainly seems to be some correlation. High leverage has been associated with lower profitability.

Why such high leverage?

Why has the mining industry become more reliant on debt? One can spin several plausible theories.

One possible explanation is that the industry has necessarily become more leveraged as it has become mechanized and more automated, less labour intensive, and therefore more capital intensive. It needed a lot more capital, and got it by borrowing. Unfortunately this does not, in fact, appear to have been the case. According to the Economic Council of Canada, the mining industry is no more capital intensive today than it was some years ago. In fact, in 1941 it was estimated to be even more capital intensive than it is today, as measured by capital dollars employed per dollar of value added (see table 7).

TABLE 7

CAPITAL INTENSITY[a]

Year	Canadian Mining Industry	Canadian Manufacturing Industry	Canadian Agriculture Industry
1941	2.4	1.0	3.9
1961	1.7	0.9	6.8
1971	2.7	0.9	8.9
1974	1.4	0.7	6.5
1976	1.5	0.8	9.2

Source: Andre Ryba, Economic Council of Canada, Financial Group.

[a] Ratio of total assets to value added.

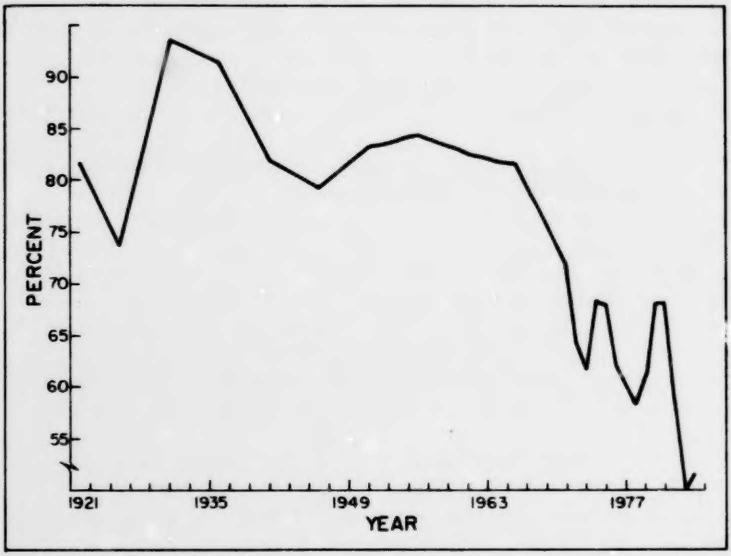

Figure 1. Long-term trend in leverage

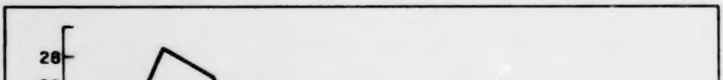

Figure 2. Long-term trend in profitability (return on assets)

A second possible explanation is that higher leverage has been forced on to mining industry management by hard times, and lack of industry profitability. There may be an element of truth in this, but one observes that the rise in leverage has continued steadily over time, through at least two recent cycles of prosperity. This suggests that management strategy has been a more compelling factor than cost, market, and competitive forces.

The third and most reasonable explanation is that increased leverage was deliberately pursued in a mistaken quest to raise return on shareholders' equity. We have just experienced a decade of perceived zero or negative real interest rates (see figure 3). When interest rates are below inflation rates, higher leverage combined with rapidly inflating commodity prices seem to offer maximum shareholder return. But if this was the strategy, it was not successful.

Typically, over the past 10 to 15 years the mining industry has been able to earn, on average, only about 10 percent to 11 percent on its invested capital (assets) before debt service and taxes. And over the past 10 to 15 years, long-term debt, (see figure 4) has cost the borrower, on average, about 11.1 percent (McLeod, Young, Weir, long-term debt average) and short-term borrowing about 11.1 percent as well (bank prime rate average). Unfortunately, the financial reward of a leveraged strategy is realized only when a firm's return on invested capital exceeds the cost of debt. That does not appear to have been the case for the Canadian mining industry over the past 10 to 15 years. The inflation bail-out of the high-debt strategy did not work because of the mining industry's inadequate return on invested capital.

Also, there is here the broad hint that the long-term average after-tax cost of debt capital has been higher for the mining industry than its after-tax cost of equity. If true, some of the reasons may be

- the frequent non-tax-paying status of many firms, which eliminates the tax subsidy factor on debt;
- perennial speculative hope which buoys up mining stock purchases and therefore P/E ratios in the market (in defiance, one might say, of investment logic) and which therefore reduces the cost of equity capital;
- the inevitability of cyclical droughts in mining industry cash flows which can be particularly damaging to highly leveraged organizations which must respond with short-term cutbacks and stop-go behaviour.

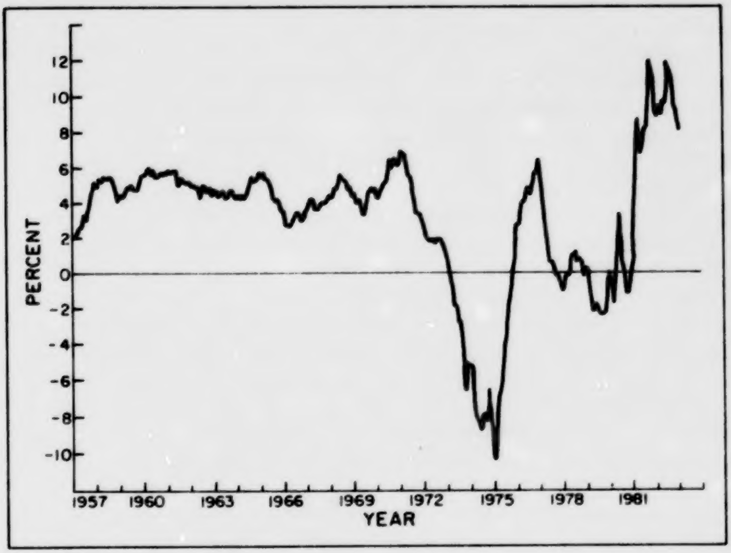

Figure 3. Real interest rates

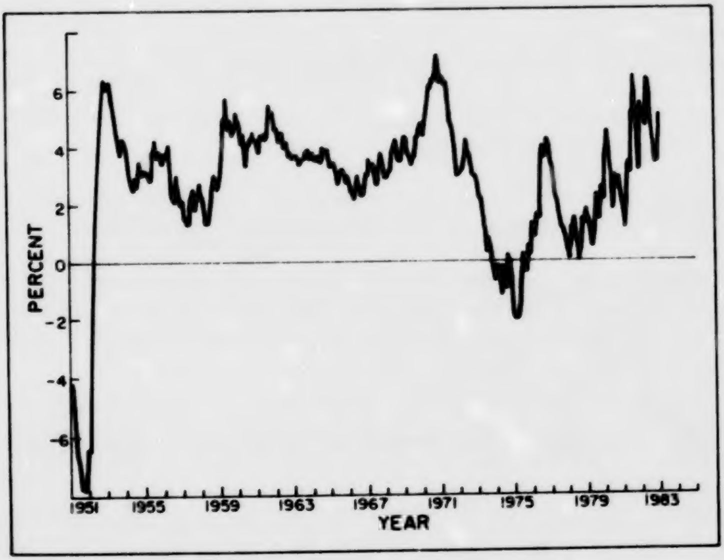

Figure 4. Long-term debt

In other words, debt has a peculiar and unique cost to the Canadian mining industry.

A fourth possible reason for the mining industry's high leverage is that, the reality of operating results notwithstanding, the Canadian stock market rewarded the Canadian mining industry for pursuing such a bold strategy. Unfortunately, 26 years of Toronto Stock Exchange experience provide little comfort for this theory. Dr. Carl Otto of Montreal Investment Management has demonstrated that, among 13 industry groupings whose shares are traded on the TSE, the metals/mining industry ranks dead last in terms of its 1.6-percent average annual growth in share prices over the period 1956 to 1982. It earned this unenviable position despite the fact that two other industries (utilities and paper) recorded an even lower average annual growth in actual earnings per share (see table 8). Therefore one can hardly conclude that the stock market enthusiastically endorsed the industry's high leverage strategy.

Our conclusion, therefore, is that high leverage was mostly the result of deliberate mining industry management strategy. However shrewd that strategy may have seemed at the time, its actual impact on most operators was to:

- drag down average financial performance;
- increase the volatility of already cyclical returns to equity investors;
- reduce the attractiveness of this industry to new equity participants;
- probably increase the interest rate risk premiums demanded by bank lenders and bond holders.

That is, on the margin it increased the cost of capital to the point where existing equity investors have been penalized mightily. Put another way: I suspect that in a cyclical, rigidly fixed-cost industry selling an undifferentiated commodity at world market prices, the cost of debt capital has tended to exceed the cost of equity capital in the long run.

One partial solution: restoration of more reasonable equity ratios

If these impressions are correct, one partial answer to the current financial 'crisis' of the industry is to return to the old time religion of less borrowing, more equity, on the balance sheet. In other words, back to basics.

TABLE 8

EARNINGS GROWTH RATE BY INDUSTRY, 1956-82[a]

Industry	Percent Compound Growth Rate per Annum of: Share Prices 1	Earnings Per Share 2	Total Earnings 3	Dilution 2 - 3	Variability of Earnings per Share (standard error of 2)
Oil and Gas	8.0	13.2	15.3	2.1	34
Communications	11.2	12.1	13.9	1.8	21
Transportation	7.8	11.0	11.2	0.2	50
Pipelines	3.4	10.5	12.7	2.2	22
Gold	9.5	10.2	11.4	1.2	59
Financial	5.2	9.0	11.8	1.8	28
Merchandising	6.1	8.4	11.9	3.5	16
All Companies: (TSE 300)	4.7	8.2	10.2	2.0	20
Management	5.3	7.4	14.4	7.0	67
Consumer	4.5	6.9	6.1	(0.8)	14
Industrial	2.9	6.9	8.7	1.8	27
Metals/Mining	1.6	6.8	7.5	0.7	36
Utilities	2.0	6.5	11.1	4.6	9
Paper	8.8	6.2	7.0	1.8	74

Source: Dr. Carl Otto, Montreal Investment Management Co., December 1982.

[a] Toronto Stock Exchange Listed Securities: 1/1/56 to 30/11/82.

Let's define an all-encompassing entity called 'Canadian Mining Industry Ltd.' which today has some $25 billion of assets, both within Canada and abroad, including a considerable degree of unconsolidated balance sheet double counting through holding companies and inter-company ownership structures. We will also accept the crude estimate that this entity today has about $15 billion of non-equity, or 'debt', and about $10 billion of equity on its balance sheet.[1] We'll further hazard the guess it will earn only about 3 percent on assets in 1983, or about $75 million, equivalent to a 7.5 percent after-tax equity return.

TABLE 9

POTENTIAL CONVERSION OF DEBT TO EQUITY CAPITAL: CANADIAN MINING INDUSTRY LTD.

	Assumed 1984 Capital Structure		
Capitalization	Current Capital Structure Estimated 1984	Debt Equals 40% of Total Liabilities	Debt Equals 25% of Total Liabilities
Debt	$15 billion	$10 billion	$6.25 billion
Equity	10	15	18.75
Total assets	$25 billion	$25 billion	$25 billion
% Debt/total assets	60%	40%	25%
Debt/equity ratio	1.5	.66	.33
% Return on assets (after tax)	3.0%	3.0%	3.0%
% Return on total equity (after tax)	7.5%	5.0%	4.0%
Profits after tax	$75 million	$75 million	$75 million
Index of earnings per share (if sell new equity at 20% of book value or about 15 to 16 times diluted earnings)	Base 100	162	170

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1. A more precise calculation by Morgan Bank of Canada shows total assets of $23.2 billion, total equity of $11.2 billion, other liabilities of $12 billion. See paper by Brenton J. Bradly, above.

And if we don't earn that in 1983, we'll tell financial analysts on Bay Street that it's virtually guaranteed for 1984, and more.

A rough back-of-the-envelope calculation suggests that if Canadian Mining Industry Ltd. could reduce its debt/equity ratio from 1.5 today to, say .66 in the not-too-distant future by substituting about $5 billion of new equity for about $5 billion of old debt, it could then raise its earnings to more than $400 million annual rate through reduced debt-service charges. If we could go even further in reducing leverage (and concurrently, debt costs) to, say, a debt/equity ratio of .33, which is not out of line with ratios much earlier in history, then earnings after tax might climb to more than $600 million per year, on a comparable basis.

At what price could the new equity be sold? And how much dilution of current shareholders' equity would occur? Well, it seems that if new shares could be sold in the vicinity of 20 percent of book value, at about 15 times the estimated 1983 earnings, the earnings per share - and therefore, we hope, share prices as well - might actually increase for current shareholders.

While one should be cautious about leaping from back-of-the-envelope speculations to judgements with respect to any individual mining company, it nevertheless seems safe to conclude that:

i the Canadian mining industry would benefit from a massive degree of recapitalization with new equity substituting for old debt;

ii in today's environment of very high 'real' interest rates, existing shareholders may benefit significantly from such recapitalization, even if new shares are necessarily sold at very substantial discounts from book value;

iii in the longer term, the cyclical environment of the mining industry and its meagre ability to earn consistently large returns on invested capital argue for capitalization based upon very low debt-to-equity ratios;

iv the ability of the industry to attract the required massive sums of new equity which are required will, in the end, hinge upon its ability to raise its return on invested capital and to lower its perceived riskiness or earnings stream volatility.

Where will the money come from?

If the banks have closed the door - and I would agree with Alf Powis' paper that for now they certainly have - and if we must reduce debt leverage anyhow, then where will all this money come from?

Let me interject some comments about the institutional market, and in particular about pension funds, since the firm I am associated with manages about $3 billion of pension fund assets. When talking about the institutional market, one must also include the life insurance companies, and government-sponsored investment agencies such as the Caisse de Depot of Quebec and Alberta's Heritage Fund.

The Canadian pension fund industry today represents close to $100 billion in trusted assets and this pool is growing at about 16 percent to 17 percent annual compound rate. This is a pretty heady growth, easily matching that of the Canadian banking industry in its recent salad days. It is rapidly becoming, if it is not already, the major source of external equity capital for Canadian business enterprise which includes, of course, the mining industry. Since this capital pool seems destined to double every 4 or 5 years, it could readily reach $250 billion in size during the early 1990s.

So if the mining industry wants to know where its investment dollars are going to come from in the future and how to get its hands on it, it had better start to analyze the tastes and attitudes of those institutional investors, and their professional consultants, financial counsellors and money managers.

Several characteristics of this capital market stand out:

i pension funds want assured long-term growth in capital and income. Total loss of capital is intolerable;

ii they are knowledgeable investors, playing for the long term;

iii they are steadily switching from bonds to equities;

iv they have a very limited appetite for lottery ticket speculations, of the common Vancouver Stock Exchange variety, although some venture capital pools aimed at pension funds have been launched (e.g. Vengrowth, by the firm I represent);

v precious metals are gaining in respectability;

vi pension funds do not pay any taxes, so tax-based instruments such as flow-through shares and limited partnerships, as described by Peter Gillin (above), do not have much appeal for them;

vii there may be a small but growing niche for commodity-linked bonds, commodity-linked preferred shares, and warrants in these portfolios;

viii pension fund counsellors and managers have developed a healthy scepticism, if not a high degree of cynicism, about people with a gleam in their eye who have just returned from the northern bush with a hot drill core. They are interested in financial track record, honesty, good management, and realism. And with these assured, they are even interested in risk. Learn more about them;

We always hear a great deal about the need for 'creative finance'. Insofar as Judy Erola's suggested vehicles for new financing are concerned, as an ex-banker I would guess that such vehicles as convertible preferreds and other tax-sheltered vehicles are probably not going to play a very big role in the mining industry, at least not right now. In order to take advantage of such after-tax vehicles, the first prerequisite is for the lender to be in a robust earnings and tax-paying position. Few lenders would seem to enjoy this luxury at the moment.

Additionally, I find it ironic that we should have cited to us by the Minister the 'abuses' of these vehicles by the banking industry, thereby driving down their effective tax rate close to zero. Of course they used them: if the government encourages tax sheltering, tax revenues will go down. At times, this basic arithmetic seems to be forgotten, and it hardly encourages other profit making (and tax paying) organizations to pursue this route, lest they too be tarred with the 'tax-dodger' brush.

The future financial environment

In conclusion, some random thoughts concerning the longer-term competitive and financial environment may help set the mining industry's current financial situation into a broader perspective.

I recently picked up a copy of John Naisbitt's new book titled Megatrends, which diagnoses significant transitions occurring in industrial society. Among these developments, according to Naisbitt, are the growth of the knowledge and information society, the movement to 'high tech/high touch'; universal global competition; the shift in attitudes from institutional help to self-reliance; and a shift from hierarchical structures to informal networks in all aspects of our lives, including our choice of governments.

As I look into my own crystal ball, I foresee other trends:

i the real cost of capital will be a significant positive number (which means no inflation bail-out from unwilling long-term lenders);
ii the world will not gradually become a calmer, more placid place (the corollaries being continuing market turbulence, commodity pricing even more volatile, and short-term cyclicality of economic forces increasing, not decreasing);
iii even less shelter than before from global competition (much of it in the mining sector emphasizing cheap labour and artificial subsidies of state enterprise abroad);
iv decline of the 'take 40 percent off-the-top' Canadian mine promoter and the concurrent rise of the intelligent investor with more exacting information and performance standards.

If one believes that at least some of these things are happening, what bearing may they have on the future financial strategy of the Canadian mining industry? I would suggest that, if the industry is to attract the necessary additional many billions of dollars of finance, particularly equity finance, then it must act as follows.

i It must recognize that in Canada, as in most Western countries, the large pools of mobile investment capital are increasingly controlled by knowledgeable institutions with excellent information concerning the financial returns available in this industry and elsewhere. Increasingly, therefore, objective reality (as opposed to gold-rush flimflam) will govern equity flows into the mining industry. This is not to put down the legitimate role of the mine promoter, but in the past too few of those dollars reached the mine face.

ii The Canadian mining industry should present its most persuasive case to the mobile investor by stressing the high technology of all aspects of its existing operations (an already existing but unpublicized and misunderstood reality); by stressing the open and responsible management of the capital under its stewardship (no funny insider deals or Byzantine ownership structures, please); and through its modern, forward-thinking profile (e.g. clean up the effluent, get rid of the depression-era housing) - in other words, by presenting a good case for being in tune with the time.

iii The industry should have learned by now not to expect governments to bail them out. Chalk it up to industrial strategizing, elitism, or just plain ignorance, but in government circles one detects little special sympathy for the mining industry and its problems. Government's attitude at best is laissez faire; at worst somewhat negative. In any case, governments have largely committed their fiscal future resources elsewhere. Furthermore there is no great mother lode of tax reduction subsidy which can be discovered within the existing mining and tax and royalty system anyway, given the marginal to low profitability of the industry. To save on taxes you must first be paying them. (But be thankful: such a 'self help' posture should reduce the hazard of the mining industry being caught up in some future web of government regulations, price and output control. Talk to your friends in the oil and gas business.)

iv In a world of increased market and commodity price volatility, as well as gyrating interest rates, it would seem prudent to better develop one's corporate capacity to survive by:
- hedging and selling forward, to reduce income volatility and increase cash flow predictability;
- stressing chains of smaller, more flexible operating units; de-emphasizing the very large, fixed overhead, unwieldy megaproject.
- de-emphasizing the fixed payment type of capital structure, while increasing the emphasis on equity and other participating forms of capital which can ride with the industry cycle.

Obviously, in this view of mine finance in Canada, I have paid little attention to the more creative forms of debt/limited-recourse project finance, government-guaranteed bonds, and so on. Others have spoken to you on these topics.

My point, reluctantly conceded as an ex-banker, is that the mining industry has been fed about all the 'creative debt' that it can stand. Any more, and we'll have to call in the undertaker. It's time for a new direction.

CONCLUSION

David Yudelman

As always, financing is the single most important key. The best prospects, the best projects, the best expansions, will be nothing without the availability of funds.

– Frank Kaplan, in Investor's Digest, 12 April 1983

Mining finance is a field in the process of rapid transformation and innovation, particularly in Canada. There are a number of reasons for this, but the major one is simple: necessity. In the last few years, two factors have converged which, once combined, created a crisis of survival which could not be ignored:

i the cyclical factor of low commodity prices and high interest rates;
ii the secular factor of the shift from equity and long-term bond financing to floating rate bank loans and project financing.

Some of the atmosphere of crisis and panic has now receded, with the arrival of lower interest rates, firmer commodity prices and short-term policy palliatives. But the longer-term issues have not been resolved, though steps are being taken on a broad front which could go a long way to creating a healthier financing structure for both large and small mining companies (and, to some extent, for Canadian resource and other companies generally).

Defining the problem

The first question to address is whether there is a real structural problem. The papers in this volume make it clear that there is: mining companies are burdened with a crippling debt structure, which has to be replaced to some extent by equity capital before substantial economic recovery is possible (see Bradly, Gillin and Sultan papers). As Noranda Mines chairman Alfred Powis put it, 'It's not that we have a shortage of capital... We have a shortage of the right kind of capital'[1]. Even the equity mini-boom of early

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[1] Interview with Toronto Globe and Mail, 23 July 1982.

1983 has probably been used by corporations to pay off their bank debts instead of for new investment, as Powis predicted in July 1982.

Those companies not crippled by unacceptably high debt-equity ratios are, by and large, the small companies which did not have the equivalent capacity to raise loans in the first place (see Dorland's paper, which also questions the consensus on the increased debt exposure of the mining industry). The small companies, however, have equally urgent financing problems of their own, the most notable being that they have not been generating the income necessary to take advantage of the various concessions and allowances offered by the tax system. The mechanisms for dealing with this would be different from those dealing with the debt-equity crisis of the large companies. But, as we shall see, the principles involved in flowing through benefits from the small mining company to the investor are similar to flowing through benefits from the large mining company to the lender.

It is generally agreed, then, that there is a problem, but there is disagreement on how important it is. Some would suggest that mine finance is not central (see Powis paper). Others suggest that it is the crucial issue.[2] Yet others argue that it is an important factor which cannot be ignored (see Mackenzie paper, which documents the striking effects of costs of capital on the viability of a wide range of deposits). Given that the structure of mining finance is at least susceptible to Canadian initiatives - unlike for example, metal prices or basic interest rates - it is clear that this problem deserves a high priority from policy makers and their advisors both in the private and public sectors.

What is being done

The problem of mining finance is already being attacked on a broad front. Some of the responses have been emergency, stop-gap measures, but contain the germs of principles which, if expanded, could be utilized to attack the structural problems as well.

A major area of developing innovation is the principle of flowing through tax benefits from the sponsoring mining company to the investor or lender. In the late 1970s the principle was extensively used by large mining and other corporations in the guise of after-tax financing.[3] The federal government stopped this practice because of what it regarded as abuses of the practice, but is still amenable to suggestions on its reintroduction in some modified form (see Erola paper).

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[2] For example, see the headnote quote, Frank Kaplan, above.

This will not be easy to achieve in the short term for three major reasons.

i The loss of federal revenue involved could be considerable, and politically embarrassing. Even the Reagan administration backed down rapidly from its 1981 tax leasing scheme when it became clear that the scheme had, by 19 February 1982, cost it more than $22 billion in tax grants. Thus effective means have to be found to ensure the grants go towards investment and the development of new business, which would probably involve a morass of new regulations.

ii The Canadian banks and financial institutions are ambivalent about a return to after-tax financing because of the visibility and public embarrassment of paying very low or no taxes.

iii The Canadian mining companies are themselves currently ambivalent about increasing their exposure to any form of debt, especially on a floating basis. This ambivalence is likely to lower after-tax financing in their list of priorities.

In the meantime, however, the government is going ahead with a number of measures designed to facilitate the raising of mine finance for smaller exploration and development companies by the mechanism of flow-through shares. Many of these measures have been in place for some time now, but have not been fully utilized because they have not been fully understood by the smaller companies and/or small unresolved impediments remained.[4]

The federal government is continuing to clear the way, for example, by a provision in the April 1983 Budget allowing the deductibility of the earned depletion associated with mine exploration expenditures from any income and not just from resource profits. This should encourage increased investment in exploration and allow the mining industry to make better use of the flow-through share and joint exploration provisions of the Income Tax Act. In turn, this should encourage the participation of investors in mining exploration.

---

[3] See William T. Cannon, 'New Mining Ventures: The Case for Preserving After-Tax Financing', (Kingston: Centre for Resource Studies, 1979).

[4] The discussions between small companies and senior Department of Finance officials at the Centre for Resource Studies policy seminar from which this study is drawn revealed both problems.

A great deal of ground still needs to be covered, however, before flow-through shares reach their full potential. In principle, the federal government departments of Finance and Energy, Mines and Resources seem fully committed to the concept, and there is an ongoing and constructive dialogue developing with organizations such as the Prospectors and Developers Association, which represents the smaller companies. In the longer term, the flow-through principle, suitably adapted, also shows promise for the larger mining companies and financial institutions.

Other measures are being taken to ease the problem of mine finance. There has been a nominal easing, for example, of the requirements for foreign investment as laid down by the Foreign Investment Review Agency, though, as we shall see, these have been largely cosmetic changes and the issue is still very much alive. The use of the investment tax credit was expanded by the 1983 Budget to allow taxpayers to reduce their federal tax payable without limitation, effectively doubling the tax credit previously available. Another Budget measure[5] will allow the tax credit to be carried back 3 years and forward 7 years, giving recognition to the cyclical nature of the mining industry and putting carry back and forward allowances into line with U.S. procedures (see Bradly paper).

Policy implications

While a good deal is being done in the field of mine finance and its policy implications, it is clear that a great deal more needs to be done. It would be tragic if the impetus established by the crisis of 1982 were to be allowed to peter out now.

---

[5] Explicitly called for in telexes and letters to the Minister of Finance and the Minister of State (Mines), from the Centre for Resource Studies seminar in March, 1983: see below, for texts of their replies.

It is not proposed here to repeat in any detail the various suggestions and prescriptions contained in the papers above, or in the literature referred to. But it might be useful to list some of the most important policy suggestions and implications under four broad headings: type, availability, cost and predictability of mine finance.

Type of finance

As was outlined in the Introduction to this study, different types of mine finance are appropriate for different stages of the mining cycle: the higher the risk, the more appropriate is equity funding; the lower the risk, the more appropriate is bank finance. The distinctions have become increasingly blurred, however, as different types of risk have been distinguished and isolated by the project financiers (see Greenwald paper) and as packages have been designed which combine the characteristics of both equity and debt finance (for example, the practice of granting equity 'kickers' to lenders which leaves them with dual claims on the producing company: as shareholders and as lenders).

Recently, there has been such a rush to get out of debt funding and back to equity that it has almost been forgotten by some that debt finance is, in many situations, more logical, flexible and cheaper (see Sultan paper). To some extent this temporary preoccuption in the mining industry was reflected in the discussions at the seminar where most of the above papers were presented.[6] These discussions showed that there was general agreement that the mineral industry's debt/equity ratios indicate the industry is encumbered with far too much debt finance. While there was some disagreement over interpretation of available statistics, the issue was seen to be whether the situation is disastrous, or merely bad. Overdependence on debt financing is of course particularly dangerous for an industry burdened with extremely long lead times and a high degree of volatility.

The obvious solution was seen to be to return to the position of two decades ago, in which equity finance predominated. But it was recognized that encouraging emergence of long-term equity finance will be a complex and difficult job. The boom of new issues on the stock markets in early 1983 could not be expected to continue indefinitely: it was pointed out that a significant number of new issues emerged in only 4 of the last 10 years (see Gillin paper).

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6. See list of seminar participants, appendix 2.

It was also pointed out that the major source of new equity finance is, and will continue to be, the financial institutions such as pension funds and insurance companies (see Sultan paper). To attract such investment in competition with the variety of other outlets available will require the development of viable and profitable mining projects, probably conceived on a less ambitious scale than the more grandiose of recent megaprojects.

A large number of measures to encourage equity investment was suggested in the course of the seminar discussions, ranging from the elimination of capital gains taxes on ultra-high risk ventures such as exploration and research and development, to debt/equity swaps, allowing companies to improve extremely poor balance sheet ratios, as far as possible without generating tax liability.

Regardless of the individual merits of these suggestions, it is also important to stand back from the current crisis and understand that it is highly unlikely the industry will ever return to the financing structures of two decades ago. The immediate problem may be to reduce debt via equity funds, but the longer-term problem is how to live with and exploit the increasingly complex sources of debt-equity mix that are now available.

To look forward in this way, rather than backward to a less complex world, entails a definite commitment of resources and time. A new division called 'Corporate Finance', to deal with the issue of how to finance corporate Canada, has been in existence for some time now in the Department of Finance.[7] The results of its work have still to be publicized. Both the mining industry and the financial institutions need to establish groups with similar expertise and long-term policy outlook if they are to contribute to policy rather than having it imposed on them.

The type of finance available to mines (and other resource companies to some extent) is thus central to the other issues of cost, availability and predictability. The overall policy climate will be of overriding importance: policy changes will ultimately determine the substitutability of debt and equity, and their the various gradations.[8]

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[7] See 'Corporate Canada on the brink', Canadian Business, July 1982, p. 168. The head of this new division, Don Tate, was at the Centre for Resource Studies seminar.

[8] See Benjamin M. Friedman, 'The Substitutability of Debt and Equity Securities', Discussion Paper Number 993 (Cambridge, Mass.: Harvard Institute of Economic Research, July 1983).

Availability of finance

It is often argued that finance will always be available 'for the right kind of projects', and that the policy aspects of mine finance should therefore be given a low priority. In essence this argument is a tautology, as the availability and terms of finance are an important determinant of whether a project is of 'the right kind' (see Introduction, and Mackenzie paper above).

Overall, availability of capital in Canada seems most dependent on the type of capital required. Canada could generate sufficient capital to cover its needs for the 1980s, but it is extremely doubtful whether it will be able to generate sufficient risk capital for mining and other megaprojects. This is partly because of the limited portfolio diversification alternatives available to investors in Canada, and it 'means that the foreign capital markets will continue to be tapped in the 1980s in a very heavy way because of these portfolio realities'.[9]

The continuing need to attract foreign capital to mining investment is one with which both the federal government and the mining industry have to come to terms. The industry cannot expect such capital to be welcomed in by government on a completely 'no-strings' basis, and the government cannot expect to attract the necessary foreign investment if it does so grudgingly and under sufferance.

The biggest perceived handicap in the area of attracting foreign investment is the perception that the Canadian government is at best ambivalent to foreign capital, at worst hostile. To some extent this is seen as a problem of perception rather than actual policy, but it is no less important for that reason. A very clear and positive statement (similar to the 'Varley Statement' in the U.K. on North Sea Oil, which encouraged a flood of foreign capital by promising to avoid pro-rationing under all circumstances) could have a noticeable effect in attracting foreign capital.[10] With regard to FIRA, many would argue for a specific and simple test - possibly on the lines of the

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[9] Arthur W. Donner, Financing the Future: Canada's Capital Markets in the Eighties, Ottawa, 1982, p. 59.

[10] Some steps have already been taken in this direction by Ottawa. See 'Would-be investors told a friendlier FIRA', Toronto Globe & Mail, 6 June 1983, and 'Need for jobs puts FIRA's role in doubt', Globe & Mail, 10 December 1983. But nothing comparable to the Varley Statement has been ventured.

Australian model - to determine whether foreign investment be allowed into Canada, after which it should be free to compete on terms of complete equality.[11]

Some economic nationalism, then, has to be accepted as a fact of life, but it has to be weighed against economic realities in a subtle way. There is no doubt that it restricts the availability of investment funds and, in so doing, raises their cost. The political and economic realities of the issue have to be balanced out and a substantially revised foreign investment review process introduced.

Cost of finance

As the banks are quick to point out, the financial institutions can have only a limited role in cutting the cost of finance. Their spreads might be narrowed somewhat, as might the front-end charges they levy on project financing packages. But, in view of the extent to which they have been burnt by over-aggressive exposure to mining and resource risks in recent years, it is more likely that they will in fact increase spreads and decrease risk-taking.

They could also help the establishment of new mining ventures by eliminating the front-end loading effects of inflation (see Kalymon paper); but this would, of course, mean greater long-term risks for the mining companies, and it is by no means clear that the latter regard correction of front-end loading as a priority.

Cutting the cost of finance, then, seems to come back to government financial and fiscal policy. This area is not confined to exploring ways to extend tax incentives and concessions, though this certainly needs to be balanced against the concessional finance, grants and incentives available internationally to the competitors of the Canadian mining industry. Of equal or more importance is the need for a policy environment which maximizes market efficiencies and enables the industry to fully utilize incentives available to it (e.g. enabling those not currently making profits to use their various allowances through the flow-through principle). There is also the need to minimize regulation, red tape and the time needed to get government approval for various transactions as all of these affect both availability and cost of finance (see Bradly paper).

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[11] See Bradly paper, above. See also David L. Anderson, Foreign Investment Control in the Canadian Mineral Sector: Lessons from the Australian Experience (Kingston: Centre for Resource Studies, 1984), for an exhaustive treatment of the topic.

Predictability of finance

When one talks of 'predictability' in this context one is really referring to two things: the stability of the general policy environment, and the tapping of long-term fixed-rate finance.

It is almost a truism that mining requires policy stability more then most industries because of its long production lead times, and because of the volatility and cyclicality of commodity prices. In this connection, the major general point is obviously that frequent and large policy changes are disruptive. At the same time, specific changes could help the cause of stability. Various suggestions range from government underwriting of resource financing (by guaranteeing borrowing costs or completion risks),[12] to counter-cyclical measures (such as a Swedish 'investment funds system'),[13] and general tax treaties for specific projects (such as the Chilean system of freezing the existing general tax rules for the life of a project).[14]

Whatever the specific suggestions, the point is that a stable policy environment can help mine financing in a wide variety of ways. Given the degree of intervention that already exists in and around the financial markets, such stability is itself not going to be achieved without some further intervention. The possibilities of simple withdrawal from markets by governments are limited in the short term, though it could be argued that this should be the longer-term goal.

The other aspect of 'predictability' of finance is the prospect of the tapping of long-term fixed-rate finance. It is now widely believed that the long-term bond market is dead, though a year or two more of stable and low rates of inflation could cast some doubt on this new conventional wisdom.

Whatever one's views on this, it is necessary to deal with the issue of the massive pools of institutional finance available from pension funds, insurance companies and other

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12. Arthur W. Donner, Financing the Future: Canada's Capital Markets in the Eighties, p. 149.
13. Jim Harries, 'Role for government in capital spending decisions', Financial Post, 9 October 1982, proposes that firms be allowed to deduct a portion of profits before tax for allocation to an investment fund. The government then permits tax-free withdrawals to be made from the fund during times of recession.
14. See paper by MacCulloch and Yudelman.

financial institutions (see Sultan paper). These flows of money might be tapped as mine finance in various ways. They could become long-term debt, they could become equity or (most likely) they could become some variant of each.

The institutional investors have become increasingly interested in high risk areas such as mining, which they have traditionally avoided. In 1982, U.S. pension funds contributed a full third of the U.S. $1.4 billion raised as venture capital.[15] Canadian institutional capital pools have been less daring to date, but are increasingly entering the field. The main problem is to devise the right mechanisms to enable massive and sophisticated institutional investors to find outlets large enough and sufficiently professional to justify really large-scale investment in mining.

In this respect, the loose requirements for listing on the Vancouver Stock Exchange, and the loosening requirements on the Toronto Stock Exchange, should be closely examined. They undoubtedly attract gamble-orientated capital, and are being supported by the junior mining companies as a result. But one has to counterbalance this source against the possible loss of institutional money.

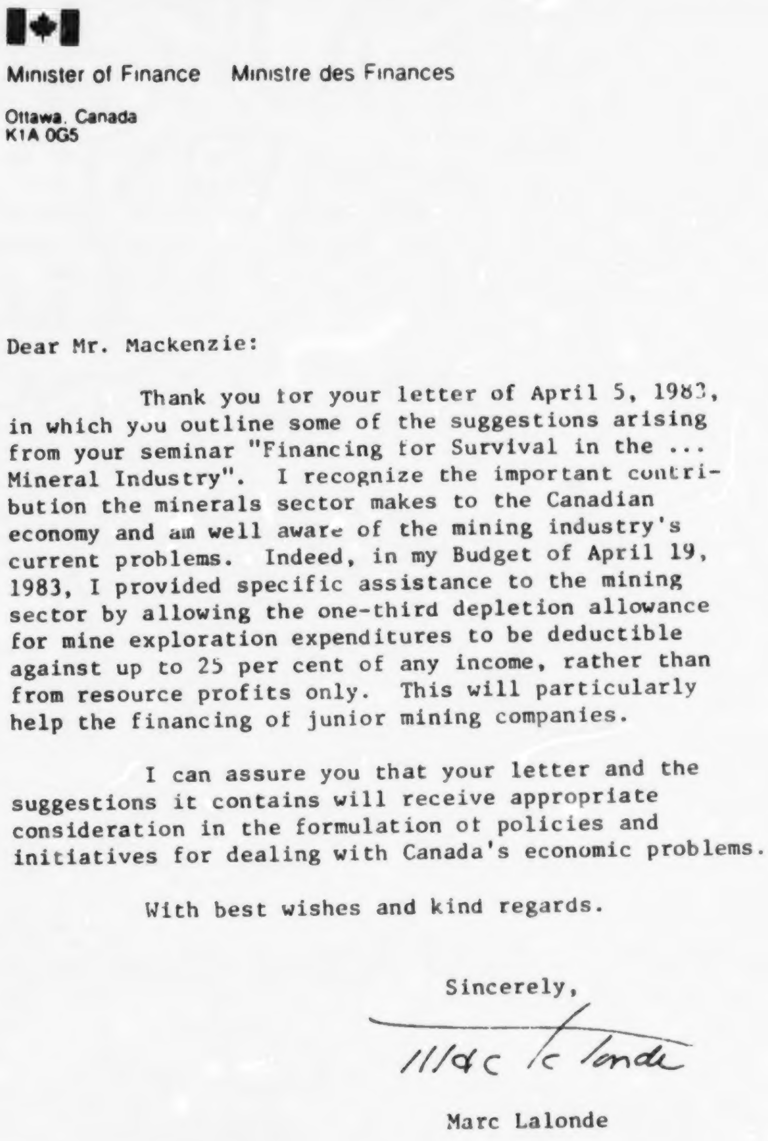
A narrow and difficult path has to be steered, in other words, between the Scylla of over-regulation and the Charybdis of opportunistic hucksterism which will discourage professional investors of large capital pools.

Ultimately this narrow path can be generalized to other areas: it is one that has to be negotiated in dealing with all the problems of mining finance, whether type, cost, availability or stability.

---

15. Marianne Tefft, 'Pension, life insurance firms lend helping hand to venture capitalists' Financial Post, 12 November 1983.

APPENDIX 1. CORRESPONDENCE FROM THE MINISTER OF FINANCE AND THE MINISTER OF STATE, MINES, ARISING FROM THE CRS SEMINAR ON 'FINANCING FOR SURVIVAL IN THE EIGHTIES'



Minister of Finance   Ministre des Finances

Ottawa, Canada
K1A 0G5

Dear Mr. Mackenzie:

Thank you for your letter of April 5, 1983, in which you outline some of the suggestions arising from your seminar "Financing for Survival in the ... Mineral Industry". I recognize the important contribution the minerals sector makes to the Canadian economy and am well aware of the mining industry's current problems. Indeed, in my Budget of April 19, 1983, I provided specific assistance to the mining sector by allowing the one-third depletion allowance for mine exploration expenditures to be deductible against up to 25 per cent of any income, rather than from resource profits only. This will particularly help the financing of junior mining companies.

I can assure you that your letter and the suggestions it contains will receive appropriate consideration in the formulation of policies and initiatives for dealing with Canada's economic problems.

With best wishes and kind regards.

Sincerely,

Marc Lalonde

Minister of State
Mines

Ottawa, Ontario
K1A 0E4

Ministre d'Etat
Mines

Ottawa (Ontario)
K1A 0E4

MAY 1 1983

Dr. Brian W. Mackenzie
Interim Executive Director
Centre for Resource Studies
Queen's University
Kingston, Ontario
K7L 3N6

Dear Dr. Mackenzie:

Thank you for your letter of April 5, 1983 further briefing me on suggestions arising out of the workshops at your recent seminar on 'Financing for Survival in the Eighties'.

It is apparent from your summaries of the positions taken on key issues that the seminar was a success. Certainly, it delighted me to be your keynote speaker. I am especially pleased that the workshop participants rose to the occasion and responded so constructively to my requests for advice on remedies to particularly troublesome fiscal and regulatory problems affecting mineral investment in Canada. In the broad areas of focus, including the long term policy environment, junior mining, industry capital structures, FIRA and international competitiveness, the seminar produced a number of innovative suggestions. It is especially pleasing to note that there was an almost unequivocal consensus that the junior mining exploration sector should be revitalized.

We will be including some of these ideas in our policy research work program. In the meantime, I will be looking forward to receiving your detailed report on the seminar proceedings.

.../2

You will have seen, of course, that there are a wide range of initiatives in the April 19 Budget which are of positive benefit to mining. Some of the principal measures are mentioned in my Press Release, which I enclose.

Yours sincerely,

Judy Erola

Enclosure

APPENDIX 2. LIST OF SEMINAR PARTICIPANTS

11th CRS Policy Discussion Seminar: Financing for Survival in the Eighties: Strategies for Short and Long Term Activities, Kingston, Canada, March 17-19, 1983

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